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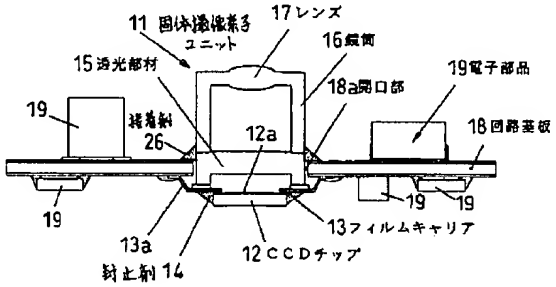
(54)【発明の名称】　固体撮像装置及びその製造方法

(57)【要約】
【課題】　固体撮像装置で、基板の一方の面に固体撮像素子ユニットを装着すると実装基板の厚みが厚くなる。そこで、固体撮像素子ユニットの高さが実質的に実装基板の最大厚みとなるように、大幅な薄型化を図る。
【解決手段】　一主面に受光面１２ａを有するＣＣＤチップ１２と、そのＣＣＤチップ１２の入出力信号を伝播するフィルムキャリア１３と、ＣＣＤチップ１２に入射する入射光を結像するレンズ１７及び光学フィルタ等の透光部材１５からなる撮像光学系とで固体撮像素子ユニット１１を組み立てる。電子部品１９を実装した回路基板１８の一部に設けた開口部１８ａに固体撮像素子ユニット１１を挿入し、実装基板の厚みが最小になる位置で固定する。



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【特許請求の範囲】

【請求項1】　一主面に受光面を有する固体撮像素子チップと、その固体撮像素子チップの入出力信号を伝播する配線手段と、前記固体撮像素子チップに入射する入射光を結像するための撮像レンズ及び光学フィルタを含む撮像光学系とからなる固体撮像素子ユニットと、
電子部品を実装し一部に貫通する開口部を有する回路基板とを備え、
前記固体撮像素子ユニットの光軸が前記回路基板に対して直角になるように、前記固体撮像素子ユニットを前記回路基板の前記開口部に挿入し、前記固体撮像素子ユニットを実装した実装基板の最大厚みが小さくなるように前記固体撮像素子ユニットの挿入方向の位置を設定し、前記配線手段を前記回路基板へ接合してなることを特徴とする固体撮像装置。

【請求項2】　配線手段は、貫通する開口を有するフィルムキャリアからなり、前記開口に位置するリードの一端と、前記開口に受光面が位置する固体撮像素子チップの電極とが接続されており、前記フィルムキャリアのリードの長さによって固体撮像素子ユニットの固定位置が設定されていることを特徴とする請求項1記載の固体撮像装置。

【請求項3】　配線手段は、貫通する開口を有するリードフレームパッケージからなり、前記開口に位置するリードの一端と、前記開口に挿入された固体撮像素子チップの電極とが接続されており、前記リードフレームパッケージのリードの長さによって固体撮像素子ユニットの固定位置が設定されていることを特徴とする請求項1記載の固体撮像装置。

【請求項4】　配線手段は、貫通する開口を有する配線基板からなり、前記開口に位置する配線の一端と、前記開口に受光面が位置する固体撮像素子チップの電極とが接続されており、前記配線基板の配線の他端と回路基板の配線との間を接続する金属ボールの大きさによって固体撮像素子ユニットの固定位置が設定されていることを特徴とする請求項1記載の固体撮像装置。

【請求項5】　配線手段は、貫通する開口を有し回路導体を設けた樹脂配線パッケージからなり、前記開口に位置する配線導体の一端と、前記開口に受光面が位置する固体撮像素子チップの電極とが接続されており、前記樹脂配線パッケージの厚みによって固体撮像素子ユニットの固定位置が設定されていることを特徴とする請求項1記載の固体撮像装置。

【請求項6】　樹脂配線パッケージに装着された固体撮像素子チップは、その外周が、前記樹脂配線パッケージの一部を含むように形成された封止樹脂により被覆されていることを特徴とする請求項5記載の固体撮像装置。

【請求項7】　樹脂配線パッケージに装着された固体撮像素子チップは、その外周が、前記樹脂配線パッケージの一部を含むように形成された金属ケースにより取り巻

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かれ、その金属ケースと固体撮像素子チップとの間に封止樹脂が充填されていることを特徴とする請求項5記載の固体撮像装置。

【請求項8】　電子部品を実装し、一部に貫通する開口部を有する回路基板が、固体撮像素子ユニットの光軸方向に複数段連結されていることを特徴とする請求項1から7のいずれか1項に記載の固体撮像装置。

【請求項9】　一部に貫通する開口部を有する回路基板に電子部品を実装する工程と、
実装した電子部品を含む回路基板の厚みとこれに装着する固体撮像素子ユニットの高さを考慮して予め接続部分の長さ若しくは厚さを設定した配線部材に、一主面に受光面を有する固体撮像素子チップを接合し封止する工程、前記配線部材に撮像レンズ及び光学フィルタを含む撮像光学系を接着し封止する工程からなる固体撮像素子ユニット組立工程と、
前記電子部品を実装した回路基板の前記開口部に、前記固体撮像素子ユニットの光軸が前記回路基板に対して直角になるように、前記固体撮像素子ユニットを挿入し、予め接続部分の長さ若しくは厚さを設定した前記配線部材を前記回路基板へ接合する工程とからなり、
前記固体撮像素子ユニットを実装した実装基板の最大厚みが小さくなるようにしたことを特徴とする請求項1記載の固体撮像装置の製造方法。

【請求項10】　一主面に受光面を有する固体撮像素子チップと、その固体撮像素子チップの入出力信号を伝播する配線手段と、前記固体撮像素子チップに入射する入射光を結像するための撮像レンズ、入射光を反射するプリズム及び光学フィルタを含む撮像光学系とからなる固体撮像素子ユニットと、
電子部品を実装し一部に貫通する開口部を有する回路基板とを備え、
前記回路基板に対し、前記プリズムに入射する入射光が直角で、前記プリズムで反射して固体撮像素子チップに入射する光が平行になるように、前記固体撮像素子ユニットを前記回路基板の前記開口部に挿入し、前記固体撮像素子ユニットを実装した実装基板の最大厚みが小さくなるように前記固体撮像素子ユニットの挿入方向の位置を設定し、固定することを特徴とする固体撮像装置。

【請求項11】　配線手段は、貫通する開口を有し回路導体を設けた樹脂配線パッケージからなり、前記開口に位置する回路導体の一端と、前記開口に受光面が位置する固体撮像素子チップの電極とが接続されていることを特徴とする請求項10記載の固体撮像装置。

【請求項12】　一部に貫通する開口部を有する回路基板に電子部品を実装する工程と、
一主面に受光面を有する固体撮像素子チップを、その固体撮像素子チップの入出力信号を伝播する配線部材に接続し封止する工程、前記配線部材に、撮像レンズ、プリズム及び光学フィルタを含む撮像光学系を接着し封止す

る工程からなる固体撮像素子ユニット組立工程と、
前記回路基板に対して、前記プリズムに入射する入射光が直角で、前記プリズムで反射した光が平行になるように、前記固体撮像素子ユニットを前記回路基板の前記開口部に挿入し、前記固体撮像素子ユニットを実装した実装基板の最大厚みが小さくなるように設定し、固定する工程と、
からなることを特徴とする請求項１０記載の固体撮像装置の製造方法。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、固体撮像装置に係り、特に、小型化、薄型化を可能にする固体撮像装置及びその製造方法に関するものである。

【０００２】

【従来の技術】近年、マルチメディア用の画像入力装置としてのカメラが脚光を浴びてきている。この種のカメラは、低価格で、単一のＤＣ電源で駆動される低消費電力のコンパクトなカメラが要望されている。殊に、その大きさは、これを搭載する機器の関係で、より薄型である必要がある。

【０００３】以下、図面を参照しながら、従来例について説明する。図２０は、従来の固体撮像装置の要部を示したものであり、１は固体撮像素子ユニットで、固体撮像素子チップとしてのＣＣＤチップ２をマウントしたＣＣＤパッケージ３、赤外線吸収フィルタ４、水晶ローパスフィルタ５、及び鏡筒６と一体型のレンズ７からなっている。８は両面に各種電子部品９を実装した多層の回路基板である。固体撮像素子ユニット１は、回路基板８の一方の面に、ＣＣＤパッケージ３から延びた外部接続端子により電気的、機械的に接続されている。

【０００４】

【発明が解決しようとする課題】しかしながら、一般的に、ＣＣＤパッケージ３にレンズ７及び光学フィルタ４，５を積み重ねて構成される固体撮像素子ユニット１は、その高さが他の電子部品の高さに比べて高く、しかも前記従来の構成のものは、回路基板８の一方の面に実装されているため、実装基板の最大厚みとしては、固体撮像素子ユニット１の高さ（端子部を含む）、回路基板８の厚み、及び回路基板８の裏面に実装された最も高い部品９の高さを加えたものとなり、この厚みは、薄型を指向する上で大きな障害となっていた。

【０００５】本発明は、このような従来の課題を解決しようとするものであり、固体撮像素子ユニットの高さが、実質的に実装基板の最大厚みとなるようにし、薄型指向を大幅に前進させた固体撮像装置及びその製造方法を提供することを目的とする。

【０００６】

【課題を解決するための手段】上記目的を達成するために、本発明の固体撮像装置は、一主面に受光面を有する

固体撮像素子チップと、その固体撮像素子チップの入出力信号を伝播する配線手段と、前記固体撮像素子チップに入射する入射光を結像するための撮像レンズ及び光学フィルタを含む撮像光学系とからなる固体撮像素子ユニットと、電子部品を実装し一部に貫通する開口部を有する回路基板とを備え、前記固体撮像素子ユニットの光軸が前記回路基板に対して直角になるように、前記固体撮像素子ユニットを前記回路基板の前記開口部に挿入し、前記固体撮像素子ユニットを実装した実装基板の最大厚みが小さくなるように前記固体撮像素子ユニットの挿入方向の位置を設定し、前記配線手段を前記回路基板へ接合してなることを特徴とするものである。

【０００７】配線手段としては、貫通する開口を有するフィルムキャリアやリードフレームパッケージ、配線基板、あるいは樹脂配線パッケージを使用し、それらのリードの長さ、あるいは配線基板と回路基板との間を接続する金属ボールの大きさ、配線パッケージの厚みによって、回路基板に対する固体撮像素子ユニットの挿入方向の位置を適切に設定するものである。

【０００８】この構成によれば、他の電子部品に比べて高さの高い固体撮像素子ユニットを回路基板に設けた開口部に挿入し、回路基板の両面に実装した他の電子部品の高さを考慮して、適切な位置で固定するので、固体撮像素子ユニットの高さを実質的に実装基板の最大厚みとすることができる。さらに、本発明では、従来のようなＣＣＤパッケージを使用することなく、裸の固体撮像素子チップを直接配線手段にボンディングするので、さらに厚みを減ずることができる。

【０００９】また、本発明の他の固体撮像装置は、一主面に受光面を有する固体撮像素子チップと、その固体撮像素子チップの入出力信号を伝播する配線手段と、前記固体撮像素子チップに入射する入射光を結像するための撮像レンズ、入射光を反射するプリズム及び光学フィルタを含む撮像光学系とからなる固体撮像素子ユニットと、電子部品を実装し一部に貫通する開口部を有する回路基板とを備え、前記回路基板に対し、前記プリズムに入射する入射光が直角で、前記プリズムで反射して固体撮像素子チップに入射する光が平行になるように、前記固体撮像素子ユニットを前記回路基板の前記開口部に挿入し、前記固体撮像素子ユニットを実装した実装基板の最大厚みが小さくなるように前記固体撮像素子ユニットの挿入方向の位置を設定し、固定することを特徴とするものである。

【００１０】この構成によれば、高さの高い固体撮像素子ユニットを回路基板に対して寝かせて配置し、回路基板に直角に入射する光をプリズムで反射させて固体撮像素子チップに入射させるようにしたので、実装基板の厚みをさらに薄くすることが可能になる。

【００１１】

【発明の実施の形態】以下、本発明の実施の形態につい

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て図面を参照しながら詳細に説明する。

(実施の形態1)図1は、本発明の実施の形態1における固体撮像装置の要部を示したものである。図1において、11は固体撮像素子ユニットであり、一主面に受光面12aを有する固体撮像素子チップとしてのCCDチップ12、そのCCDチップ12の入出力信号を伝播する配線手段としてのフィルムキャリア13、光学フィルタ等からなる透光部材15、鏡筒16と一体型でCCDチップ12に入射する入射光を結像するためのレンズ17からなっている。18は、各種電子部品19を表裏両面に実装し、一部に貫通する開口部18aを有する多層の回路基板である。

【0012】ここで、固体撮像素子ユニット11は、その光軸が回路基板18の面に対して直角になるように、回路基板18の開口部18aに挿入され、しかも、回路基板18の表面及び裏面にそれぞれ実装された電子部品19の高さを考慮して、その挿入方向の位置を任意に設定し、フィルムキャリア13のリード13aの長さを決めて回路基板18の接続ランドに接合する。また、固体撮像素子ユニット11は、接着剤26によって回路基板18に機械的に固定される。

【0013】図2は、回路基板18の下面に比較的高い電子部品19が実装されているので、固体撮像素子ユニット11を図1の場合よりさらに回路基板18の下面側に突出させ、その分、フィルムキャリア13のリード13aの長さを長くしてある。

【0014】回路基板18に設ける開口部18aとしては、図6に示したように、基板の中程に形成した角形あるいは丸形等の開口部であってもよく、また、図7に示したように、基板の縁部を切り欠いたコの字形やU字形の開口部であってもよい。

【0015】図8は、フィルムキャリア13に対するCCDチップ12の装着状態を示している。フィルムキャリア13は、貫通する開口13bを有し、この開口13bにCCDチップ12の受光面12aを位置合わせする。そして、開口13bに位置するリード(インナーリード)13cの一端と、CCD電極パッド12bとをバンプ12cを介した状態で接続する。さらに、フィルムキャリア13とCCDチップ12の周囲との間に、例えばエポキシ樹脂等からなる封止剤14を充填し、湿気等の外部雰囲気を遮断してCCDチップ12を保護するようにしている。

【0016】次に、本実施の形態1における固体撮像装置の製造方法を図9を用いて説明する。まず、図9(a)に示したように、CCDチップ12の受光面12a側に設けたバンプ12cにフィルムキャリア13のインナーリード13cをボンディングツール21により接合する。なお、この時、フィルムキャリア13のリード(アウターリード)13aの長さは、実装した電子部品を含む回路基板の厚みとこれに装着する固体撮像素子ユニットの高さを考慮して、予め設定しておくのが好ましい。

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【0017】次に、図9(b)に示したように、フィルムキャリア13とCCDチップ12の周囲との間にエポキシ樹脂等からなる封止剤14をディスペンサー22を用いて注入、充填する。

【0018】その後、図9(c)に示したように、フィルムキャリア13のCCDチップ12の装着側とは反対側に光学フィルタ等からなる透光部材15を接着封止20する。接着剤としては、加熱硬化型又は紫外線硬化型の樹脂が使用できる。この透光部材15の接着封止20で、CCDチップ12の素子は封止され、外部雰囲気と遮断される。ここで、フィルムキャリア13のリード13aは、図9(d)に示したように、予め設定した固体撮像素子ユニット11の回路基板18への装着位置に応じて、透光部材15側にフォーミングされる。

【0019】次に、図9(e)に示したように、透光部材15の上に、鏡筒16と一体型の結像レンズ17を接着する。この接着剤としては、透光部材15の場合と同様に、加熱硬化型又は紫外線硬化型の樹脂が使用できる。このようにして固体撮像素子ユニット11が組み立てられる。

【0020】次に、図9(f)に示したように、電子部品19が両面に実装された回路基板18の貫通する開口部18aに、固体撮像素子ユニット11を、その光軸が回路基板に対して直角になるように挿入する。固体撮像素子ユニット11におけるフィルムキャリア13のリード13aは、予め所定の長さでフォーミングされているので、図9(g)に示したように、そのまま回路基板18の所定のランドにはんだ付け24され、その後、回路基板18の開口部18aの縁部と透光部材15、あるいはレンズの鏡筒16の側面とを熱硬化型又は紫外線硬化型の接着剤26で接着固定する。これにより、回路基板18に対する固体撮像素子ユニット11の実装工程が終了する。

【0021】以上のように構成された本実施の形態1によれば、他の電子部品に比べて高さの高い固体撮像素子ユニット11を、回路基板18に形成した開口部18aの中に挿入し、回路基板18に実装されている他の電子部品の高さを考慮して、適切な位置で固定するので、固体撮像素子ユニット11の高さが、実質的に実装基板の最大厚みとなり、従来の構成に比べて大幅に薄型化を図ることができる。

【0022】なお、図3に示したように、電子部品を実装し、一部に貫通する開口部を有する回路基板が、固体撮像素子ユニット11の光軸方向に複数段連結されていてもよい。回路基板18間の電気的接続手段としては、例えば基板間を機械的に結合する結合手段に導電性のスペーサ23を設けるようにしてもよい。

【0023】(実施の形態2)図4は、本発明の実施の形

態２における固体撮像装置の要部を示したものである。なお、図１のものと同一構成要素には同一符号を付してある。ここでは、配線手段として、貫通する開口（段付き）２５ｂを有するリードフレームパッケージ２５を用いた点に特徴を有し、開口２５ｂの内部に位置するリード２５ａの一端に、開口２５ｂに挿入されたＣＣＤチップ１２の電極が接続される。リードフレームパッケージ２５のリード２５ａの長さは、固体撮像素子ユニット２８の回路基板１８の固定位置により決定される。１４はリードフレームパッケージ２５の開口２５ｂに挿入されたＣＣＤチップ１２の周囲の間隙部に充填された封止剤である。

【００２４】図１０は、本実施の形態２の製造方法を示したものである。図１０（ａ）に示すＣＣＤチップ１２を、図１０（ｂ）に示したように、リードフレームパッケージ２５にマウントし、バンプ１２ｃとリード２５ａとを接続する。なお、リード２５ａの長さは、回路基板への装着位置を考慮して予め設定しておく。ＣＣＤチップ１２の周囲とリードフレームパッケージ２５との間隙部には、図１０（ｃ）に示したように、ディスペンサー２２により封止剤１４を充填して封止する。

【００２５】次に、図１０（ｄ）に示したように、リードフレームパッケージ２５のＣＣＤチップ１２の装着側とは反対側に光学フィルタ等からなる透光部材１５を接着封止２０する。接着剤としては、加熱硬化型又は紫外線硬化型の樹脂が使用できる。この透光部材１５の接着で、ＣＣＤチップ１２の素子は外部雰囲気と遮断され、保護される。

【００２６】次に、図１０（ｅ）に示したように、透光部材１５の上に、鏡筒１６と一体型のレンズ１７を接着する。この接着剤としては、透光部材１５の場合と同様に、加熱硬化型又は紫外線硬化型の樹脂が使用できる。このようにして固体撮像素子ユニット２８が組み立てられる。

【００２７】次に、図１０（ｆ）に示したように、電子部品１９が両面に実装された回路基板１８の貫通する開口部１８ａに、固体撮像素子ユニット２８を、その光軸が回路基板に対して直角になるように挿入する。固体撮像素子ユニット２８におけるリードフレームパッケージ２５のリード２５ａは、予め所定の長さで透光部材１５側にフォーミングされているので、そのまま、図１０（ｇ）に示したように、回路基板１８の所定のランドにはんだ付け２４され、固体撮像素子ユニット実装工程が終了する。

【００２８】以上のように構成された本実施の形態２によれば、他の電子部品に比べて高さの高い固体撮像素子ユニット２８を、回路基板１８に形成した開口部１８ａの中に挿入し、回路基板１８に実装されている他の電子部品の高さを考慮して、適切な位置で固定するので、固体撮像素子ユニット２８の高さが、実質的に実装基板の最大厚みとなり、従来の構成に比べて大幅に薄型化を図ることができる。

【００２９】なお、リードフレームパッケージ２５を使用した場合でも、図３に示したように、電子部品を実装し一部に貫通する開口部を有する回路基板が、固体撮像素子ユニットの光軸方向に複数段連結されていてもよいことは言うまでもない。

【００３０】（実施の形態３）図５は、本発明の実施の形態３における固体撮像装置の要部を示したものである。なお、図１のものと同一構成要素には同一符号を付してある。ここでは、配線手段として、貫通する開口３１ａを有する配線基板３１を用いた点に特徴を有し、開口３１ａに位置する配線（図示せず）に、開口３１ａに受光面を位置させたＣＣＤチップ１２の電極が接続される。配線基板３１の配線の他端と回路基板１８の配線との間は、金属ボール、例えばろうボール３２で接続される。固体撮像素子ユニット３３の回路基板１８への固定位置は、ろうボール３２の大きさ、あるいは配線基板３１の厚みにより決定される。１４は配線基板３１とＣＣＤチップ１２の周囲との間に充填された封止剤である。

【００３１】図１１は、本実施の形態３の製造方法を示したものである。図１１（ａ）に示すＣＣＤチップ１２を、図１１（ｂ）に示したように、配線基板３１に装着する。即ち、ＣＣＤチップ１２のバンプ１２ｃと配線基板３１の開口３１ａ近傍に位置する配線（図示せず）とを接続する。そして、図１１（ｃ）に示したように、配線基板３１とＣＣＤチップ１２の周囲との間に封止剤１４を充填する。

【００３２】次に、図１１（ｄ）に示したように、配線基板３１のＣＣＤチップ１２装着側とは反対側に光学フィルタ等からなる透光部材１５を接着封止２０し、さらに、その上に鏡筒１６と一体型の結像レンズ１７を接着する。接着剤としては、加熱硬化型又は紫外線硬化型の樹脂が使用できる。透光部材１５の接着封止２０で、ＣＣＤチップ１２の素子は外部雰囲気と遮断される。この状態で固体撮像素子ユニット３３が完成する。さらに、ＣＣＤチップ１２の電極が接続された配線基板３１の配線の他端（透光部材１５側の面に導出）には、回路基板の配線と接続するためのろうボール３２を載せ、はんだ付けにより接合する。

【００３３】次に、図１１（ｅ）に示したように、電子部品１９が両面に実装された回路基板１８の貫通する開口部１８ａに、固体撮像素子ユニット３３を、その光軸が回路基板１８に対して直角になるように挿入し、回路基板１８の所定のランドに配線基板３１に載せたろうボール３２を接合する。これで、固体撮像素子ユニット実装工程が終了する。

【００３４】以上のように構成された本実施の形態３によれば、他の電子部品に比べて高さの高い固体撮像素子ユニット３３を回路基板１８に形成した開口部１８ａの

中に挿入し、回路基板１８に実装されている他の電子部品の高さを考慮して、ろうボール３２の大きさ、あるいは配線基板３１の厚みを調整することにより、固体撮像素子ユニット３３の高さが、実質的に実装基板の最大厚みとなり、従来の構成に比べて大幅に薄型化を図ることができる。

【００３５】なお、本実施の形態３においても、図３に示したように、電子部品を実装し、一部に貫通する開口部を有する回路基板が、固体撮像素子ユニットの光軸方向に複数段連結されていてもよい。

【００３６】（実施の形態４）図１２は、本発明の実施の形態４における固体撮像装置の要部を示したものである。なお、図１のものと同一構成要素には同一符号を付してある。図１２において、１２はＣＣＤチップであり、受光面１２ａ側に外部接続電極としてのバンプ１２ｃを有する。４１は樹脂配線パッケージであり、図１３に示したように、中央部に貫通する開口４１ａを有し、かつ厚さｔのフランジ部４１ｂを備えている。また所要の位置に配線導体４２が、例えばメッキ等の手段により形成されている。ここでは、樹脂配線パッケージ４１の開口４１ａの対向する両側に、一方の面の開口４１ａの縁部から外壁に沿って他方の面の縁部まで延びた複数の配線導体４２が一定の間隔でそれぞれ配置されているが、開口４１ａを取り巻く四方の外壁に沿って配線導体が形成されていてもよい。樹脂配線パッケージ４１のＣＣＤチップ１２取付面とは反対側の面には、透光部材１５及び鏡筒１６と一体型のレンズ１７が接着されている。

【００３７】図１４は、本実施の形態４の製造方法を示したものである。図１４（ａ）に示すＣＣＤチップ１２を、図１４（ｂ）に示したように、樹脂配線パッケージ４１の開口４１ａに合わせて、バンプ１２ｃと配線導体４２とを接続する。次に、図１４（ｃ）に示したように、ＣＣＤチップ１２の周囲と樹脂配線パッケージ４１との間隙部に、ディスペンサー２２により封止剤１４を充填して封止する。

【００３８】次に、図１４（ｄ）に示したように、樹脂配線パッケージ４１のＣＣＤチップ１２の装着側とは反対側に透光部材１５を接着封止２０する。この透光部材１５の接着で、ＣＣＤチップ１２の素子は外部雰囲気と遮断され保護される。次いで、図１４（ｅ）に示したように、透光部材１５の上に、鏡筒１６と一体型のレンズ１７を接着する。このようにして固体撮像素子ユニット４０が組み立てられる。

【００３９】次に、図１４（ｆ）に示したように、電子部品１９が両面に実装された回路基板１８の貫通する開口部１８ａに、固体撮像素子ユニット４０を、その光軸が回路基板に対して直角になるように挿入し、フランジ部４１ｂを開口部１８ａの縁部に載せて、配線導体４２と回路基板１８の所定のランドとをはんだ付け２４して、固体撮像素子ユニット実装工程を終了する。

【００４０】以上のように構成された本実施の形態４によれば、固体撮像素子ユニット４０の回路基板１８に対する固定位置は、樹脂配線パッケージ４１のフランジ部４１ｂの厚さｔによつて設定される。したがって、他の電子部品に比べて高さの高い固体撮像素子ユニット４０を、回路基板１８に形成した開口部１８ａの中に挿入し、回路基板１８に実装されている他の電子部品の高さを考慮して、適切な位置で固定するので、固体撮像素子ユニット４０の高さが、実質的に実装基板の最大厚みとなり、従来の構成に比べて大幅に薄型化を図ることができる。

【００４１】図１５は、実施の形態４の変形例を示したもので、固体撮像素子ユニット４０を、回路基板１８の開口部１８ａに下側から挿入し、樹脂配線パッケージ４１の透光部材１５接着面側縁部を回路基板１８に当接させてはんだ付け２４したものである。つまり、図１２の場合と比較して、固体撮像素子ユニット４０を回路基板１８の裏面側に、フランジ部４１ｂの厚さｔだけ突出させて固定したものである。

【００４２】このように、本実施の形態４によれば、フランジ部ないしは樹脂配線パッケージの全体の厚みによって固体撮像素子ユニットの固定位置を設定することができる。

【００４３】図１６は、固体撮像素子ユニット４０において、ＣＣＤチップ１２の外周及び樹脂配線パッケージ４１の一部までを封止剤３７で被覆したものである。また、図１７は、ＣＣＤチップ１２の外周及び樹脂配線パッケージ４１の一部までを取り巻く金属ケース３８を設け、その金属ケース３８の内側に封止剤３７を充填したものである。このような構成にすることにより、ＣＣＤチップ１２に対する気密封止性能を一層高めることができる。

【００４４】（実施の形態５）図１８は、本発明の実施の形態５における固体撮像装置の要部を示したものである。ここでは、プリズム光学系を用いた構成で、薄型化を図るようにしたものである。

【００４５】図１８において、１２はＣＣＤチップであり、受光面１２ａ側に外部接続電極としてのバンプ１２ｃを有する。４１は貫通する開口４１ａを有する樹脂配線パッケージであり、所要の位置に配線導体４２が、例えばメッキ等の手段により形成されている。１４は、ＣＣＤチップ１２を樹脂配線パッケージ４１の開口４１ａに合わせて装着し、ＣＣＤチップ１２の周囲を封止する封止剤である。４４はＣＣＤチップ１２に入射する入射光を結像するためのレンズで、樹脂配線パッケージ４１に保持されている。４５は入射光の角度を変える三角プリズムであり、この三角プリズム４５とＣＣＤチップ１２との間に透光部材１５が配置されている。

【００４６】樹脂配線パッケージ４１に、ＣＣＤチップ

12と、レンズ44、三角プリズム45及び透光部材15からなる撮像光学系を装着して固体撮像素子ユニット46が構成されている。この固体撮像素子ユニット46は、回路基板18に対して、レンズ44に入射する入射光が直角で、三角プリズム45で反射してCCDチップ12に入射する光が平行になるような向きで、回路基板18の開口部18aに挿入され、配線導体42が回路基板18の所定のランドに対してはんだ付け24され固定される。

【0047】図19は、本実施の形態5の製造方法を示したもので、まず、図19（a）に示したように、樹脂配線パッケージ41の開口41aに受光面12aを合わせてCCDチップ12を装着し、CCDチップ12のバンプ12cを配線導体42に接続する。そして、図19（b）に示したように、CCDチップ12の周囲に封止剤14を充填し封止する。

【0048】次に、樹脂配線パッケージ41の所定の位置にレンズ44を装着し、また、三角プリズム45及びこれに接着された透光部材15を、レンズ44とCCDチップ12との間に配置し、接着剤を用いて樹脂配線パッケージ41に接着封止20する。CCDチップ12は、その接着封止20と封止剤14による封止で、外部雰囲気と遮断される。

【0049】以上のように構成された本実施の形態5によれば、高さの高い固体撮像素子ユニット46を回路基板18の開口部18aに寝かせて配置し、回路基板18に直角に入射する光を三角プリズム45で反射させてCCDチップ12に入射させることにより、従来のものに比べて実装基板の厚みを大幅に薄くすることが可能になる。

【0050】

【発明の効果】以上説明したように、請求項1～請求項9に記載の発明によれば、他の電子部品に比べて高さの高い固体撮像素子ユニットを回路基板に設けた開口部に挿入し、回路基板の両面に実装した他の電子部品の高さを考慮して、適切な位置で固定するので、実質的に固体撮像素子ユニットの高さを実装基板の最大厚みとすることができる。さらに、従来のようなCCDパッケージを使用することなく、裸の固体撮像素子チップを直接配線手段にボンディングするので、さらに厚みを減ずることができ、大幅な薄型化を図ることができる。

【0051】また、請求項10～請求項12に記載の発明によれば、高さの高い固体撮像素子ユニットを回路基板に対して寝かせて配置し、回路基板に直角に入射する光をプリズムで反射させて固体撮像素子チップに入射させるようにしており、しかも、回路基板に設けた開口部に、適切な位置で固定するので、実装基板の厚みをさらに薄くすることが可能になる。

【図面の簡単な説明】

【図1】本発明の実施の形態1における固体撮像装置の要部の断面図

【図2】図1の固体撮像素子ユニットの位置を回路基板に実装した電子部品の高さに応じて基板の下側へずらせて固定した図

【図3】回路基板を複数枚積み重ねて構成した図

【図4】本発明の実施の形態2における固体撮像装置の要部の断面図

【図5】本発明の実施の形態3における固体撮像装置の要部の断面図

【図6】回路基板の中央付近に設けた開口部にCCDチップを実装した例を示す斜視図

【図7】回路基板の縁部を切り欠いて設けた開口部にCCDチップを実装した例を示す斜視図

【図8】図1のフィルムキャリアにCCDチップを装着した状態を示す図

【図9】本発明の実施の形態1における製造方法を示す図

【図10】本発明の実施の形態2における製造方法を示す図

【図11】本発明の実施の形態3における製造方法を示す図

【図12】本発明の実施の形態4における固体撮像装置の要部の断面図

【図13】図12の樹脂配線パッケージの詳細な構成図

【図14】本発明の実施の形態4における製造方法を示す図

【図15】本発明の実施の形態4における変形例の要部の断面図

【図16】本発明の実施の形態4における固体撮像素子ユニットの変形例を示す断面図

【図17】本発明の実施の形態4における固体撮像素子ユニットの他の変形例を示す断面図

【図18】本発明の実施の形態5における固体撮像装置の要部の断面図

【図19】本発明の実施の形態5における製造方法を示す図

【図20】従来例における固体撮像装置の要部の断面図

【符号の説明】

11，28，33，40，46　固体撮像素子ユニット
12　CCDチップ
12a　受光面
12b　CCD電極パッド
12c　バンプ
13　フィルムキャリア
13a　リード
13b，25b，31a，41a　開口
14　封止剤
15　透光部材
16　鏡筒
17　レンズ

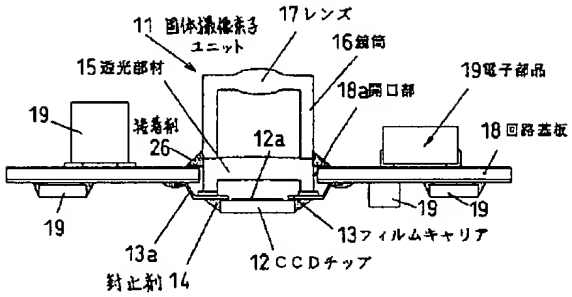
１３

１８　回路基板
１８ａ　開口部
１９　電子部品
２０　接着封止
２４　はんだ付け
２５　リードフレームパッケージ
２５ａ　リード
２６　接着剤

１４

３１　配線基板
３２　ろうボール
３７　封止剤
３８　金属ケース
４１　樹脂配線パッケージ
４２　配線導体
４４　レンズ
４５　三角プリズム

【図１】



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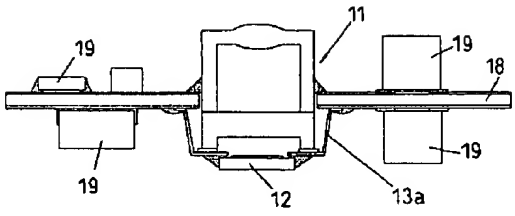

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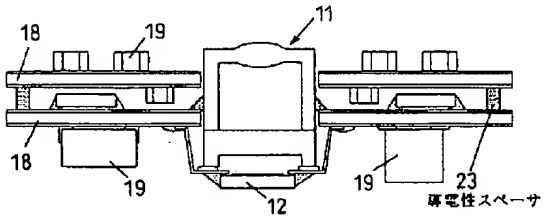

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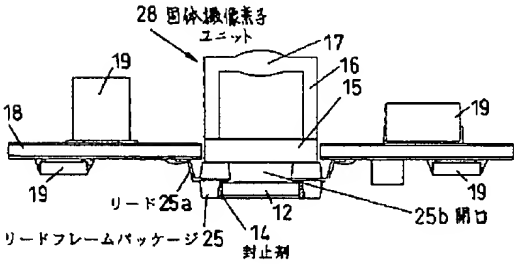

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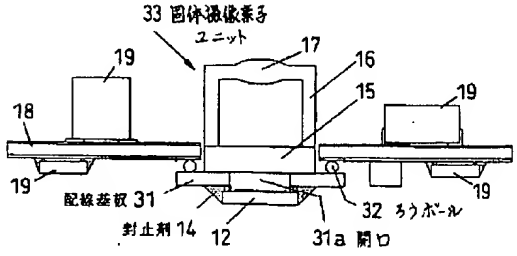

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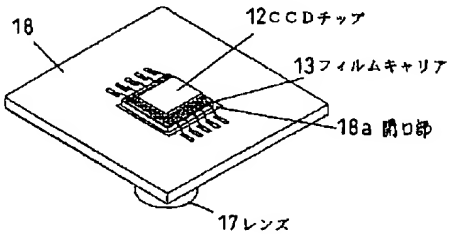

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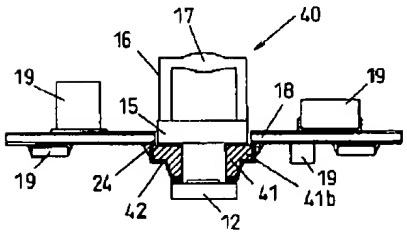

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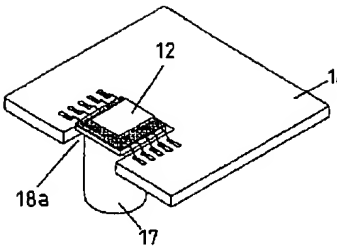

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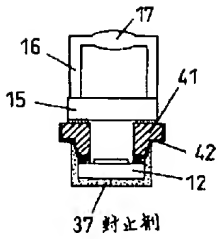

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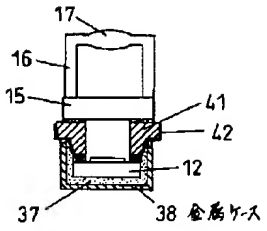

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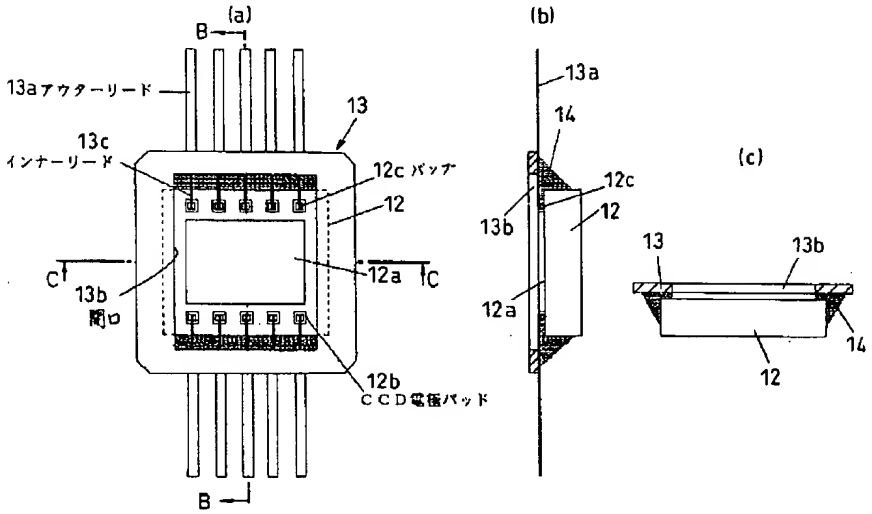

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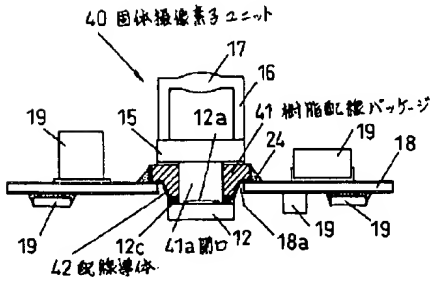

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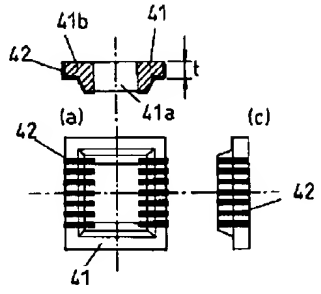

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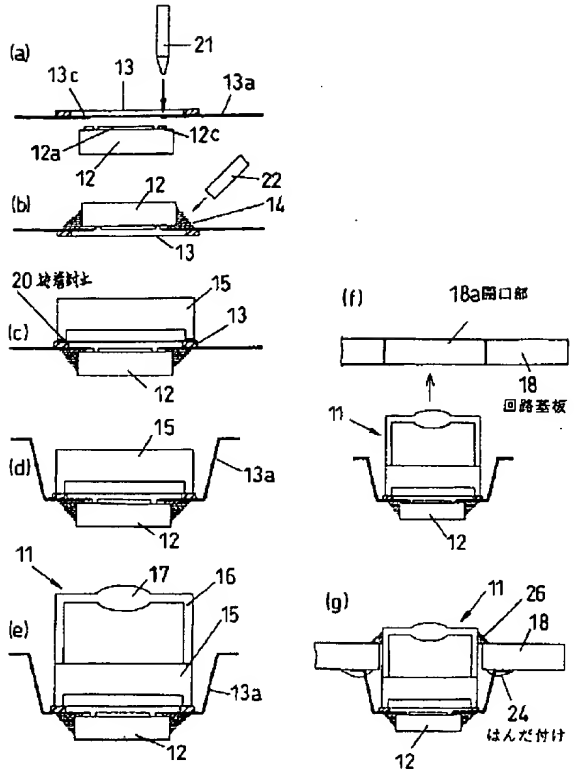

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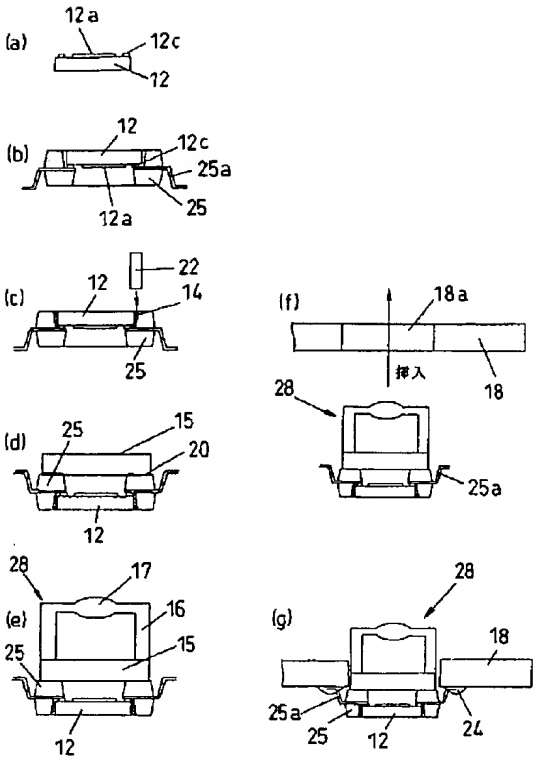

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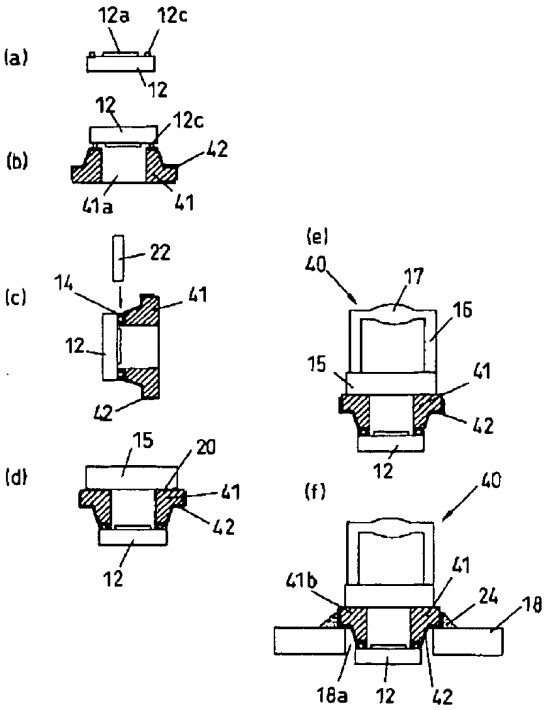

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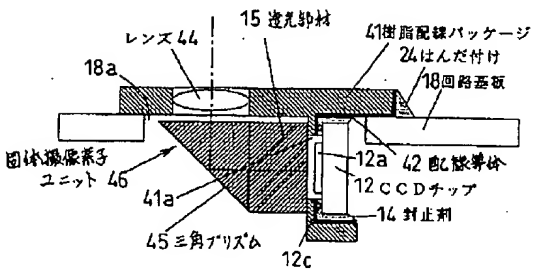

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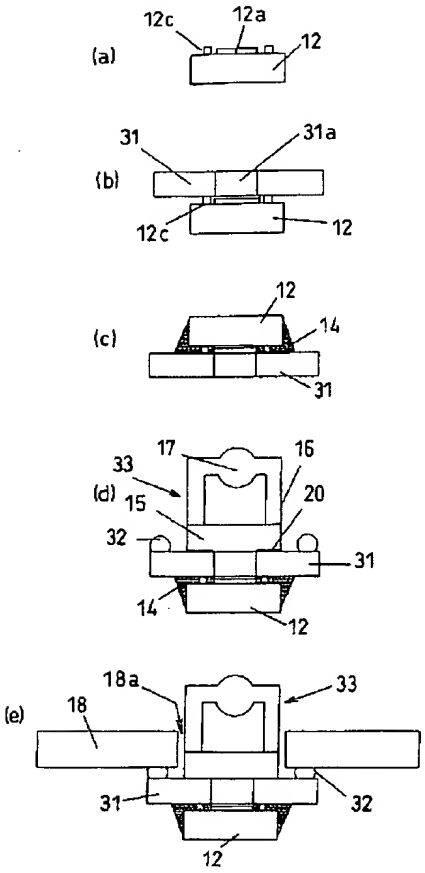

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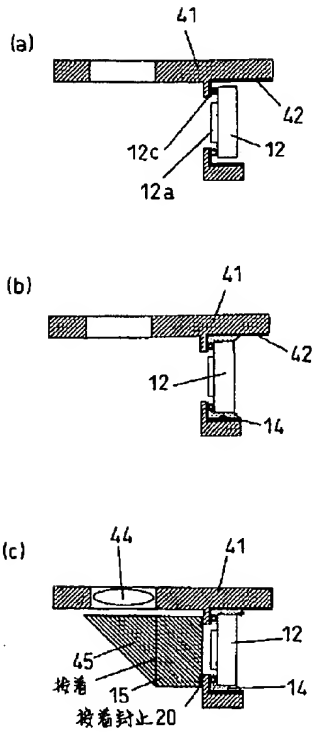

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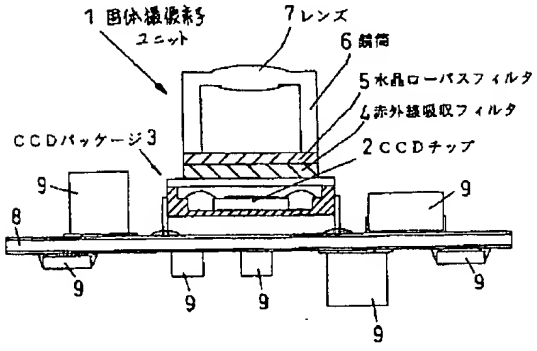

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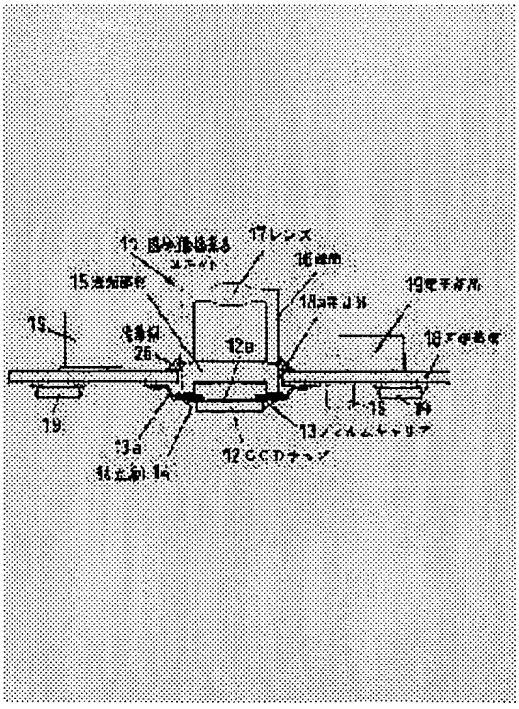
(54) SOLID-STATE IMAGE PICKUP DEVICE AND ITS MANUFACTURE

(57)Abstract:

PROBLEM TO BE SOLVED: To attain a remarkably thin profile in a way that a height of a solid- state image pickup element unit is substantially equal to a maximum thickness of a mounted printed circuit board because the thickness of the mount printed circuit board is thicker when the solid-state image pickup element unit is mounted on one side of the printed circuit board in the solid-state image pickup device.

SOLUTION: A solid-state image pickup element unit 11 is assembled with a CCD chip 12 whose one major side has a light receiving face 12a, a film carrier 13 that propagates input output signals of the CCD chip 12, and an image pickup optical system consisting of a lens 17 that forms light incident onto the CCD chip 12 and of a light transmission member 15 such as an optical filter. The solid-state image pickup element



unit 11 is inserted to an opening 18a provided to part of a printed circuit board 18 on which electronic components 19 mounted and the unit 11 is fixed at a position at which the thickness of the mounted printed circuit board is minimized.

LEGAL STATUS

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[Date of requesting appeal against examiner's decision of rejection]	
[Date of extinction of right]	

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3.In the drawings, any words are not translated.

TECHNICAL FIELD

[A technical field to which invention belongs] This invention relates to a solid state camera, and relates to a solid state camera which enables a miniaturization and thin shape-ization especially, and its manufacture method.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] In recent years, the camera as a picture input device for multimedia is brought into the limelight. This kind of camera is a low price, and the compact camera of the low power driven by the single DC power supply is demanded. Especially, the magnitude needs to be the relation of the device which carries this, and needs to be a thin shape more.
[0003] Hereafter, the conventional example is explained, referring to a drawing. Drawing 20 shows the important section of the conventional solid state camera, and 1 is a solid state image sensor unit, and consists of the CCD package 3 which mounted the CCD chip 2 as a solid state image sensor chip, the infrared absorption filter 4, a Xtal low pass filter 5, and a lens 7 of a lens-barrel 6 and one apparatus. 8 is the multilayer circuit board which mounted the various electronic parts 9 in both sides. The solid state image sensor unit 1 is being connected electrically and mechanically by the external end-connection child prolonged from the CCD package 3 in one field of the circuit board 8.

[Translation done.]

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3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] Since it fixes in a suitable location in consideration of the height of other electronic parts which inserted in opening which prepared the solid state image sensor unit with high height in the circuit board compared with other electronic parts, and were mounted in both sides of the circuit board according to invention according to claim 1 to 9 as explained above, the height of a solid state image sensor unit can be substantially made into the maximum thickness of a mounting substrate. Furthermore, since bonding of the naked solid state image sensor chip is carried out to a direct wiring means, without using a CCD package like before, thickness can be reduced further and large thin shape-ization can be attained.
[0051] Moreover, since it fixes to opening which put to sleep and arrange a solid state image sensor unit with high height to the circuit board, made the circuit board reflect the light which carries out incidence at a right angle by prism, and he is trying to make carry out incidence to a solid state image sensor chip, and was moreover prepared in the circuit board in a suitable location according to invention according to claim 10 to 12, it becomes possible to make thickness of a mounting substrate still thinner.

[Translation done.]

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3.In the drawings, any words are not translated.

TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Generally however, the solid state image sensor unit 1 constituted by the CCD package 3 by accumulating a lens 7 and light filters 4 and 5 The height is high compared with the height of other electronic parts. Moreover, the thing of the configuration of said former Since it is mounted in one field of the circuit board 8, as the maximum thickness of a mounting substrate It became what applied the height (a terminal area is included) of the solid state image sensor unit 1, the thickness of the circuit board 8, and the height of the highest components 9 mounted in the rear face of the circuit board 8, and this thickness had become a serious failure when pointed to a thin shape.
[0005] Tend to solve such a conventional technical problem, it is made for the height of a solid state image sensor unit to serve as the maximum thickness of a mounting substrate substantially, and this invention aims at offering the solid state camera which advanced thin orientation sharply, and its manufacture method.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The cross section of the important section of the solid state camera in the gestalt 1 of operation of this invention
[Drawing 2] Drawing which could shift to the substrate bottom according to the height of the electronic parts which mounted the location of the solid state image sensor unit of drawing 1 in the circuit board, and was fixed
[Drawing 3] Drawing which accumulated two or more circuit boards and constituted them
[Drawing 4] The cross section of the important section of the solid state camera in the gestalt 2 of operation of this invention
[Drawing 5] The cross section of the important section of the solid state camera in the gestalt 3 of operation of this invention
[Drawing 6] The perspective diagram showing the example which mounted the CCD chip in the opening prepared near the center of the circuit board
[Drawing 7] The perspective diagram showing the example which mounted the CCD chip in the opening which cut the edge of the circuit board, and lacked and prepared it
[Drawing 8] Drawing showing the condition of having equipped the tape carrier package of drawing 1 with the CCD chip
[Drawing 9] Drawing showing the manufacture method in the gestalt 1 of operation of this invention
[Drawing 10] Drawing showing the manufacture method in the gestalt 2 of operation of this invention
[Drawing 11] Drawing showing the manufacture method in the gestalt 3 of operation of this invention
[Drawing 12] The cross section of the important section of the solid state camera in the gestalt 4 of operation of this invention
[Drawing 13] The detailed block diagram of the resin wiring package of drawing 12
[Drawing 14] Drawing showing the manufacture method in the gestalt 4 of operation of this invention
[Drawing 15] The cross section of the important section of the modification in the gestalt 4 of operation of this invention
[Drawing 16] The cross section showing the modification of the solid state image sensor unit in the gestalt 4 of operation of this invention
[Drawing 17] The cross section showing other modifications of the solid state image sensor unit in the gestalt 4 of operation of this invention
[Drawing 18] The cross section of the important section of the solid state camera in the gestalt 5 of operation of this invention
[Drawing 19] Drawing showing the manufacture method in the gestalt 5 of operation of this invention
[Drawing 20] The cross section of the important section of the solid state camera in the conventional example
[Description of Notations]
11, 28, 33, 40, 46 Solid state image sensor unit
12 CCD Chip

12a Light-receiving side
12b CCD electrode pad
12c Bump
13 Tape Carrier Package
13a Lead
13b, 25b, 31a, 41a Opening
14 Encapsulant
15 Translucent Part Material
16 Lens-barrel
17 Lens
18 Circuit Board
18a Opening
19 Electronic Parts
20 Adhesion Closure
24 Soldering
25 Leadframe Package
25a Lead
26 Adhesives
31 Wiring Substrate
32 Wax Ball
37 Encapsulant
38 Metal Casing
41 Resin Wiring Package
42 Wiring -- Conductor
44 Lens
45 Triangular Prism

[Translation done.]

* NOTICES *

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to a solid state camera, and relates to the solid state camera which enables miniaturization and thin shape-ization especially, and its manufacture method.
[0002]
[Description of the Prior Art] In recent years, the camera as a picture input device for multimedia is brought into the limelight. This kind of camera is a low price, and the compact camera of the low power driven by the single DC power supply is demanded. Especially, the magnitude needs to be the relation of the device which carries this, and needs to be a thin shape more.
[0003] Hereafter, the conventional example is explained, referring to a drawing. Drawing 20 shows the important section of the conventional solid state camera, and 1 is a solid state image sensor unit, and consists of the CCD package 3 which mounted the CCD chip 2 as a solid state image sensor chip, the infrared absorption filter 4, a Xtal low pass filter 5, and a lens 7 of a lens-barrel 6 and one apparatus. 8 is the multilayer circuit board which mounted the various electronic parts 9 in both sides. The solid state image sensor unit 1 is being connected electrically and mechanically by the external end-connection child prolonged from the CCD package 3 in one field of the circuit board 8.
[0004]
[Problem(s) to be Solved by the Invention] Generally however, the solid state image sensor unit 1 constituted by the CCD package 3 by accumulating a lens 7 and light filters 4 and 5 The height is high compared with the height of other electronic parts. Moreover, the thing of the configuration of said former Since it is mounted in one field of the circuit board 8, as the maximum thickness of a mounting substrate It became what applied the height (a terminal area is included) of the solid state image sensor unit 1, the thickness of the circuit board 8, and the height of the highest components 9 mounted in the rear face of the circuit board 8, and this thickness had become a serious failure when pointed to a thin shape.
[0005] Tend to solve such a conventional technical problem, it is made for the height of a solid state image sensor unit to serve as the maximum thickness of a mounting substrate substantially, and this invention aims at offering the solid state camera which advanced thin orientation sharply, and its manufacture method.
[0006]
[Means for Solving the Problem] In order to attain the above-mentioned purpose, a solid state camera of this invention A solid state image sensor chip which has a light-receiving side in one principal plane, and a wiring means to spread an I/O signal of the solid state image sensor chip, A solid state image sensor unit which consists of image pick-up optical system containing an image pick-up lens and a light filter for carrying out image formation of the incident light which carries out incidence to said solid state image sensor chip, So that it may have the circuit board which has opening which mounts electronic parts and is penetrated to a part and an optical axis of said solid state image sensor unit may become a

right angle to said circuit board Insert said solid state image sensor unit in said opening of said circuit board, and a location of the path of insertion of said solid state image sensor unit is set up so that the maximum thickness of a mounting substrate which mounted said solid state image sensor unit may become small. It is characterized by coming to join said wiring means to said circuit board.
[0007] A tape carrier package which has a opening to penetrate as a wiring means, a leadframe package and a wiring substrate, or a resin wiring package is used, and a location of the path of insertion of a solid state image sensor unit to the circuit board is appropriately set up with the length of those leads or magnitude of a metal ball which connects between a wiring substrate and the circuit boards, and thickness of a wiring package.
[0008] Since it fixes in a suitable location in consideration of height of other electronic parts which inserted in opening which prepared a solid state image sensor unit with high height in the circuit board compared with other electronic parts, and were mounted in both sides of the circuit board according to this configuration, height of a solid state image sensor unit can be substantially made into the maximum thickness of a mounting substrate. Furthermore, in this invention, since bonding of the naked solid state image sensor chip is carried out to a direct wiring means, without using a CCD package like before, thickness is further reducible.
[0009] Moreover, a solid state image sensor chip whose solid state cameras of other of this invention have a light-receiving side in one principal plane, An image pick-up lens for carrying out image formation of the incident light which carries out incidence to said solid state image sensor chip to a wiring means to spread an I/O signal of the solid state image sensor chip, A solid state image sensor unit which consists of image pick-up optical system containing prism and a light filter which reflect incident light, Incident light which is equipped with the circuit board which has opening which mounts electronic parts and is penetrated to a part, and carries out incidence to said prism to said circuit board is right-angled. So that light which reflects by said prism and carries out incidence to a solid state image sensor chip may become parallel Said solid state image sensor unit is inserted in said opening of said circuit board, and a location of the path of insertion of said solid state image sensor unit is set up, and it is characterized by fixing so that the maximum thickness of a mounting substrate which mounted said solid state image sensor unit may become small.
[0010] Since according to this configuration put to sleep and arrange a solid state image sensor unit with high height to the circuit board, the circuit board is made to reflect light which carries out incidence at a right angle by prism and it was made to carry out incidence to a solid state image sensor chip, it becomes possible to make thickness of a mounting substrate still thinner.
[0011]
[Embodiment of the Invention] Hereafter, it explains to details, referring to a drawing about the gestalt of operation of this invention.
(Gestalt 1 of operation) Drawing 1 shows the important section of the solid state camera in the gestalt 1 of operation of this invention. In drawing 1 , 11 is a solid state image sensor unit, and has become the CCD chip 12 from the lens 17 for carrying out image formation of the incident light which carries out incidence by the translucent part material 15 and lens-barrel 16 which consist of the CCD chip 12 as a solid state image sensor chip which has light-receiving side 12a in one principal plane, a tape carrier package 13 as a wiring means to spread the I/O signal of the CCD chip 12, a light filter, etc., and one apparatus. 18 is the multilayer circuit board which has opening 18a which mounts the various electronic parts 19 in front reverse side both sides, and is penetrated to a part.
[0012] In consideration of the height of the electronic parts 19 which were inserted in opening of the circuit board 18 18a so that, as for the solid state image sensor unit 11, the optical axis might become a right angle to the field of the circuit board 18 here, and were moreover mounted in the surface of the circuit board 18, and a rear face, respectively, the location of the path of insertion is set as arbitration, the length of lead of tape carrier package 13 13a is decided, and it joins to the connection land of the circuit board 18. Moreover, the solid state image sensor unit 11 is mechanically fixed to the circuit board 18 by adhesives 26.
[0013] Since the comparatively high electronic parts 19 are mounted in the inferior surface of tongue of

the circuit board 18, drawing 2 makes the solid state image sensor unit 11 project from the case of drawing 1 to the inferior-surface-of-tongue side of the circuit board 18 further, and has lengthened the length of lead 13a of the part and a tape carrier package 13.
[0014] As opening 18a prepared in the circuit board 18, as shown in drawing 6 , you may be openings, such as a square shape formed in the middle of the substrate, or a round shape, and as shown in drawing 7 , you may be opening of the typeface of KO, or U typeface which cut and lacked the edge of a substrate.
[0015] Drawing 8 shows the wearing condition of the CCD chip 12 over a tape carrier package 13. A tape carrier package 13 has opening 13b to penetrate, and carries out alignment of the light-receiving side 12a of the CCD chip 12 to this opening 13b. And the end of lead (inner lead) 13c located in opening 13b and CCD electrode pad 12b are connected where bump 12c is minded. Furthermore, it is filled up with the encapsulant 14 which consists of an epoxy resin etc. between a tape carrier package 13 and the perimeter of the CCD chip 12, and he intercepts external ambient atmospheres, such as moisture, and is trying to protect the CCD chip 12.
[0016] Next, the manufacture method of the solid state camera in the gestalt 1 of this operation is explained using drawing 9 . First, as shown in drawing 9 (a), inner lead 13c of a tape carrier package 13 is joined to bump 12c prepared in the light-receiving side 12a side of the CCD chip 12 with the bonding tool 21. In addition, as for the length of lead (outer lead) 13a of a tape carrier package 13, it is desirable at this time to set up beforehand in consideration of the thickness of the circuit board containing the mounted electronic parts and the height of the solid state image sensor unit with which this is equipped.
[0017] Next, as shown in drawing 9 (b), a dispenser 22 is used between a tape carrier package 13 and the perimeter of the CCD chip 12, and it is poured in and filled up with the encapsulant 14 which consists of an epoxy resin etc.
[0018] Then, as shown in drawing 9 (c), the translucent part material 15 which becomes the opposite side from a light filter etc. is turned on a CCD chip 12 of tape carrier package 13 wearing-side adhesion closure 20. As adhesives, the resin of a heat hardening mold or an ultraviolet curing mold can be used. By the adhesion closure 20 of this translucent part material 15, the closure of the element of the CCD chip 12 is carried out, and it is intercepted with an external ambient atmosphere. Here, as shown in drawing 9 (d), according to the stowed position to the circuit board 18 of the solid state image sensor unit 11 set up beforehand, foaming of the lead 13a of a tape carrier package 13 is carried out to the translucent part material 15 side.
[0019] Next, as shown in drawing 9 (e), the image formation lens 17 of a lens-barrel 16 and one apparatus is pasted up on the translucent part material 15. As these adhesives, the resin of a heat hardening mold or an ultraviolet curing mold can be used like the case of the translucent part material 15. Thus, the solid state image sensor unit 11 is assembled.
[0020] Next, as shown in drawing 9 (f), the solid state image sensor unit 11 is inserted in opening 18a by which electronic parts 19 were mounted in both sides and which the circuit board 18 penetrates so that the optical axis may become a right angle to the circuit board. Since foaming of the lead 13a of the tape carrier package 13 in the solid state image sensor unit 11 is beforehand carried out by predetermined length, as shown in drawing 9 (g), it is used as the predetermined land of the circuit board 18 soldering 24 as it is, and carries out adhesion immobilization of the side of the edge of opening 18a of the circuit board 18, the translucent part material 15, or the lens-barrel 16 of a lens with the adhesives 26 of a heat-curing mold or an ultraviolet curing mold after that. Thereby, the mounting production process of the solid state image sensor unit 11 to the circuit board 18 is completed.
[0021] According to the gestalt 1 of this operation constituted as mentioned above, it compares with other electronic parts. The solid state image sensor unit 11 with high height Since it fixes in a suitable location in consideration of the height of other electronic parts which insert into opening 18a formed in the circuit board 18, and are mounted in the circuit board 18 The height of the solid state image sensor unit 11 serves as the maximum thickness of a mounting substrate substantially, and thin shape-ization can be sharply attained compared with the conventional configuration.
[0022] In addition, as shown in drawing 3 , electronic parts are mounted and two or more steps of circuit

boards which have opening penetrated to a part may be connected in the direction of an optical axis of the solid state image sensor unit 11. You may make it form the conductive spacer 23 in the coupling means which combines between substrates mechanically, for example as an electrical connecting means between the circuit boards 18.

[0023] (Gestalt 2 of operation) Drawing 4 shows the important section of the solid state camera in the gestalt 2 of operation of this invention. In addition, the same sign is given to the same component as the thing of drawing 1 . Here, it has the feature at the point using the leadframe package 25 which has opening (with stage) 25b to penetrate as a wiring means, and the electrode of the CCD chip 12 inserted in opening 25b is connected to the end of lead 25a located in the interior of opening 25b. The length of lead 25a of the leadframe package 25 is determined by the fixed position of the circuit board 18 of the solid state image sensor unit 28. 14 is the encapsulant with which the gap section around the CCD chip 12 inserted in opening 25b of the leadframe package 25 was filled up.

[0024] Drawing 10 shows the manufacture method of the gestalt 2 this operation. The CCD chip 12 shown in drawing 10 (a) is mounted on the leadframe package 25, as shown in drawing 10 (b), and bump 12c and lead 25a are connected. In addition, the length of lead 25a is beforehand set up in consideration of the stowed position to the circuit board. In the gap section of the perimeter of the CCD chip 12, and the leadframe package 25, as shown in drawing 10 (c), it is filled up with encapsulant 14 with a dispenser 22, and closes.

[0025] Next, as shown in drawing 10 (d), the translucent part material 15 which becomes the opposite side from a light filter etc. is turned on a CCD chip 12 of leadframe package 25 wearing-side adhesion closure 20. As adhesives, the resin of a heat hardening mold or an ultraviolet curing mold can be used. By adhesion of this translucent part material 15, the element of the CCD chip 12 is intercepted with an external ambient atmosphere, and is protected.

[0026] Next, as shown in drawing 10 (e), the lens 17 of a lens-barrel 16 and one apparatus is pasted up on the translucent part material 15. As these adhesives, the resin of a heat hardening mold or an ultraviolet curing mold can be used like the case of the translucent part material 15. Thus, the solid state image sensor unit 28 is assembled.

[0027] Next, as shown in drawing 10 (f), the solid state image sensor unit 28 is inserted in opening 18a by which electronic parts 19 were mounted in both sides and which the circuit board 18 penetrates so that the optical axis may become a right angle to the circuit board. As it is, since foaming of the lead 25a of the leadframe package 25 in the solid state image sensor unit 28 is beforehand carried out to the translucent part material 15 side by predetermined length, as shown in drawing 10 (g), it is used as the predetermined land of the circuit board 18 soldering 24, and a solid state image sensor unit mounting production process ends it.

[0028] According to the gestalt 2 of this operation constituted as mentioned above, it compares with other electronic parts. The solid state image sensor unit 28 with high height Since it fixes in a suitable location in consideration of the height of other electronic parts which insert into opening 18a formed in the circuit board 18, and are mounted in the circuit board 18 The height of the solid state image sensor unit 28 serves as the maximum thickness of a mounting substrate substantially, and thin shape-ization can be sharply attained compared with the conventional configuration.

[0029] In addition, even when the leadframe package 25 is used, as shown in drawing 3 , it cannot be overemphasized that two or more steps of circuit boards which have opening which mounts electronic parts and is penetrated to a part may be connected in the direction of an optical axis of a solid state image sensor unit.

[0030] (Gestalt 3 of operation) Drawing 5 shows the important section of the solid state camera in the gestalt 3 of operation of this invention. In addition, the same sign is given to the same component as the thing of drawing 1 . Here, it has the feature at the point using the wiring substrate 31 which has opening 31a to penetrate as a wiring means, and the electrode of the CCD chip 12 which located the light-receiving side in opening 31a is connected to the wiring (not shown) located in opening 31a. Between the other end of wiring of the wiring substrate 31, and wiring of the circuit board 18, it connects with the metal ball 32, for example, a wax ball. The fixed position to the circuit board 18 of the solid state image

sensor unit 33 is determined by the magnitude of the wax ball 32, or the thickness of the wiring substrate 31. 14 is the encapsulant with which it filled up between the wiring substrate 31 and the perimeter of the CCD chip 12.

[0031] Drawing 11 shows the manufacture method of the gestalt 3 this operation. As shown in drawing 11 (b), the wiring substrate 31 is equipped with the CCD chip 12 shown in drawing 11 (a). That is, bump 12c of the CCD chip 12 and the wiring (not shown) located near the opening 31a of the wiring substrate 31 are connected. And as shown in drawing 11 (c), it is filled up with encapsulant 14 between the wiring substrate 31 and the perimeter of the CCD chip 12.

[0032] Next, as shown in drawing 11 (d), the translucent part material 15 which is from a light filter etc. on a wiring substrate 31 CCD chip 12 wearing-side in the opposite side is carried out adhesion closure 20, and the image formation lens 17 of a lens-barrel 16 and one apparatus is further pasted up on it. As adhesives, the resin of a heat hardening mold or an ultraviolet curing mold can be used. By the adhesion closure 20 of the translucent part material 15, the element of the CCD chip 12 is intercepted with an external ambient atmosphere. The solid state image sensor unit 33 is completed in this condition. Furthermore, the ball 32 cursed in order to connect with wiring of the circuit board is put on the other end (it derives to the field by the side of the translucent part material 15) of wiring of the wiring substrate 31 to which the electrode of the CCD chip 12 was connected, and it joins to it with soldering.

[0033] Next, as shown in drawing 11 (e), the solid state image sensor unit 33 is inserted so that the optical axis may become a right angle to the circuit board 18, and the ball 32 which will be put on the wiring substrate 31 at the predetermined land of the circuit board 18 is joined to opening 18a by which electronic parts 19 were mounted in both sides and which the circuit board 18 penetrates. Now, a solid state image sensor unit mounting production process is completed.

[0034] According to the gestalt 3 of this operation constituted as mentioned above, it inserts into opening 18a which formed the solid state image sensor unit 33 with high height in the circuit board 18 compared with other electronic parts. In consideration of the height of other electronic parts mounted in the circuit board 18, by adjusting the magnitude of the wax ball 32, or the thickness of the wiring substrate 31 The height of the solid state image sensor unit 33 serves as the maximum thickness of a mounting substrate substantially, and thin shape-ization can be sharply attained compared with the conventional configuration.

[0035] In addition, also in the gestalt 3 of this operation, as shown in drawing 3 , electronic parts are mounted and two or more steps of circuit boards which have opening penetrated to a part may be connected in the direction of an optical axis of a solid state image sensor unit.

[0036] (Gestalt 4 of operation) Drawing 12 shows the important section of the solid state camera in the gestalt 4 of operation of this invention. In addition, the same sign is given to the same component as the thing of drawing 1 . In drawing 12 , 12 is a CCD chip and has bump 12c as an external connection electrode in the light-receiving side 12a side. 41 is a resin wiring package, as shown in drawing 13 , had opening 41a penetrated in the center section, and is equipped with flange 41b of thickness t. moreover, a necessary location -- wiring -- the conductor 42 is formed by means, such as plating. two or more wiring here prolonged from the edge of opening 41a of one field to the edge of the field of another side in accordance with the outer wall on both sides which opening 41a of the resin wiring package 41 counters -- the outer wall of the four way type which surround opening 41a although the conductor 42 is arranged at the fixed gap, respectively -- meeting -- wiring -- the conductor may be formed. With CCD chip 12 clamp face of the resin wiring package 41, the lens 17 of the translucent part material 15 and a lens-barrel 16, and one apparatus has pasted the field of the opposite side.

[0037] Drawing 14 shows the manufacture method of the gestalt 4 this operation. the CCD chip 12 shown in drawing 14 (a) was shown in drawing 14 (b) -- as -- opening 41a of the resin wiring package 41 -- doubling -- bump 12c and wiring -- a conductor 42 is connected. Next, as shown in drawing 14 (c), the gap section of the perimeter of the CCD chip 12 and the resin wiring package 41 is filled up with encapsulant 14 with a dispenser 22, and it closes.

[0038] Next, as shown in drawing 14 (d), the translucent part material 15 is turned on a CCD chip 12 of resin wiring package 41 wearing-side adhesion closure 20 in the opposite side. By adhesion of this

translucent part material 15, the element of the CCD chip 12 is intercepted with an external ambient atmosphere, and is protected. Subsequently, as shown in drawing 14 (e), the lens 17 of a lens-barrel 16 and one apparatus is pasted up on the translucent part material 15. Thus, the solid state image sensor unit 40 is assembled.

[0039] next, as shown in drawing 14 (f), the optical axis becomes a right angle to the circuit board about the solid state image sensor unit 40 at opening 18a by which electronic parts 19 were mounted in both sides and which the circuit board 18 penetrates -- as -- inserting -- flange 41b -- the edge of opening 18a -- carrying -- wiring -- a conductor 42 and the predetermined land of the circuit board 18 are carried out soldering 24, and a solid state image sensor unit mounting production process is ended.

[0040] According to the gestalt 4 of this operation constituted as mentioned above, therefore, the fixed position to the circuit board 18 of the solid state image sensor unit 40 is set as thickness t of flange 41b of the resin wiring package 41. Therefore, since it fixes in a suitable location in consideration of the height of other electronic parts which insert into opening 18a which formed the solid state image sensor unit 40 with high height in the circuit board 18 compared with other electronic parts, and are mounted in the circuit board 18, the height of the solid state image sensor unit 40 serves as the maximum thickness of a mounting substrate substantially, and thin shape-ization can be sharply attained compared with the conventional configuration.

[0041] It is what showed the modification of the gestalt 4 of operation, and drawing 15 inserts the solid state image sensor unit 40 in opening 18a of the circuit board 18 from the bottom, it makes the translucent part material 15 adhesion side side edge section of the resin wiring package 41 contact the circuit board 18, and carries out it soldering 24. That is, as compared with the case of drawing 12 , only thickness [of flange 41b] t makes the solid state image sensor unit 40 project, and it is fixed to the rear-face side of the circuit board 18.

[0042] Thus, according to the gestalt 4 of this operation, the fixed position of a solid state image sensor unit can be set up with the thickness of a flange or the whole resin wiring package.

[0043] Drawing 16 covers the periphery of the CCD chip 12, and some resin wiring packages 41 with encapsulant 37 in the solid state image sensor unit 40. Moreover, drawing 17 establishes the metal casing 38 which surround the periphery of the CCD chip 12, and some resin wiring packages 41, and is filled up with encapsulant 37 inside the metal casing 38. By making it such a configuration, the hermetic seal engine performance to the CCD chip 12 can be raised further.

[0044] (Gestalt 5 of operation) Drawing 18 shows the important section of the solid state camera in the gestalt 5 of operation of this invention. Here, thin shape-ization is attained with the configuration which used prism optical system.

[0045] In drawing 18 , 12 is a CCD chip and has bump 12c as an external connection electrode in the light-receiving side 12a side. the resin wiring package which has opening 41a which penetrates 41 -- it is -- a necessary location -- wiring -- the conductor 42 is formed by means, such as plating. 14 is encapsulant which equips with the CCD chip 12 according to opening 41a of the resin wiring package 41, and closes the perimeter of the CCD chip 12. 44 is a lens for carrying out image formation of the incident light which carries out incidence to the CCD chip 12, and is held at the resin wiring package 41. 45 is triangular prism into which the angle of incident light is changed, and the translucent part material 15 is arranged between this triangular prism 45 and the CCD chip 12.

[0046] It equips with the image pick-up optical system which becomes the resin wiring package 41 from the CCD chip 12, a lens 44 and the triangular prism 45, and the translucent part material 15, and the solid state image sensor unit 46 is constituted. to the circuit board 18, this solid state image sensor unit 46 has the right-angled incident light which carries out incidence to a lens 44, is the sense to which the light which reflects by the triangular prism 45 and carries out incidence to the CCD chip 12 becomes parallel, and is inserted in opening 18a of the circuit board 18 -- having -- wiring -- to the predetermined land of the circuit board 18, a conductor 42 is carried out soldering 24 and fixed.

[0047] drawing 19 is what showed the manufacture method of the gestalt 5 this operation, and was first shown in drawing 19 (a) -- as -- opening 41a of the resin wiring package 41 -- light-receiving side 12a -- doubling -- the CCD chip 12 -- equipping -- bump 12c of the CCD chip 12 -- wiring -- it connects with a

conductor 42. And as shown in drawing 19 (b), encapsulant 14 is filled up with and closed around the CCD chip 12.

[0048] Next, the translucent part material 15 which equipped the position of the resin wiring package 41 with the lens 44, and was pasted up on the triangular prism 45 and this is arranged between a lens 44 and the CCD chip 12, and is made the resin wiring package 41 adhesion closure 20 using adhesives. The CCD chips 12 are the adhesion closure 20 and the closure by encapsulant 14, and are intercepted with an external ambient atmosphere.

[0049] According to the gestalt 5 of this operation constituted as mentioned above, it becomes possible to make thickness of a mounting substrate thin sharply compared with the conventional thing by putting to sleep and arranging the solid state image sensor unit 46 with high height to opening 18a of the circuit board 18, making the circuit board 18 reflect the light which carries out incidence at a right angle by the triangular prism 45, and carrying out incidence to the CCD chip 12.

[0050]

[Effect of the Invention] Since it fixes in a suitable location in consideration of the height of other electronic parts which inserted in opening which prepared the solid state image sensor unit with high height in the circuit board compared with other electronic parts, and were mounted in both sides of the circuit board according to invention according to claim 1 to 9 as explained above, the height of a solid state image sensor unit can be substantially made into the maximum thickness of a mounting substrate. Furthermore, since bonding of the naked solid state image sensor chip is carried out to a direct wiring means, without using a CCD package like before, thickness can be reduced further and large thin shape-ization can be attained.

[0051] Moreover, since it fixes to opening which put to sleep and arrange a solid state image sensor unit with high height to the circuit board, made the circuit board reflect the light which carries out incidence at a right angle by prism, and he is trying to make carry out incidence to a solid state image sensor chip, and was moreover prepared in the circuit board in a suitable location according to invention according to claim 10 to 12, it becomes possible to make thickness of a mounting substrate still thinner.

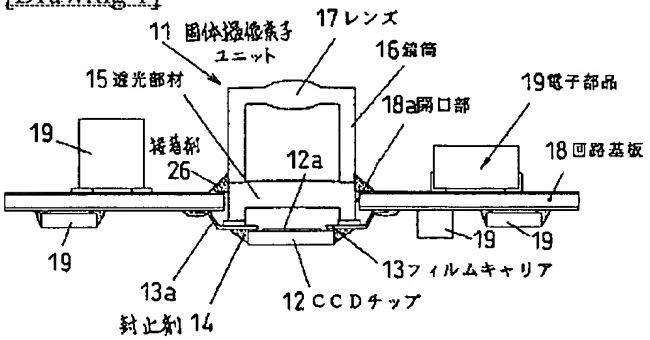
[Translation done.]

* NOTICES *

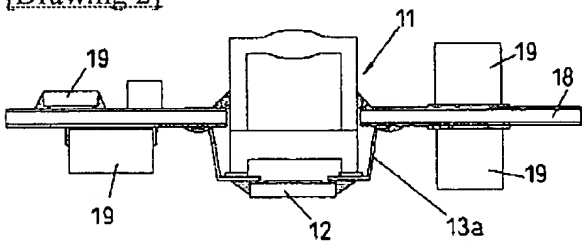
1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DRAWINGS

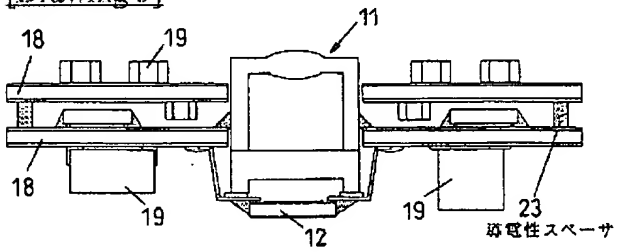
[Drawing 1]



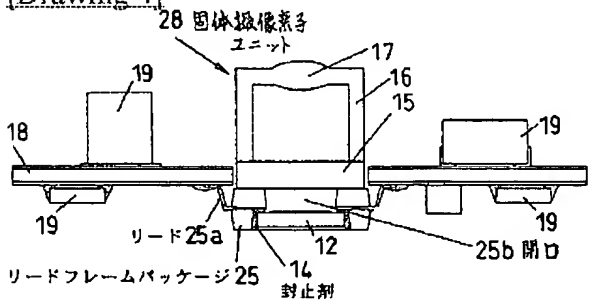
[Drawing 2]



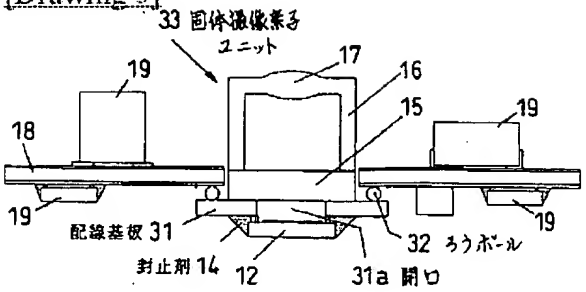
[Drawing 3]



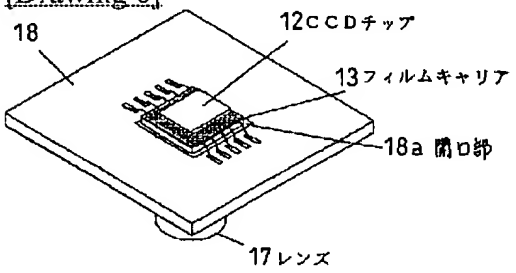
[Drawing 4]



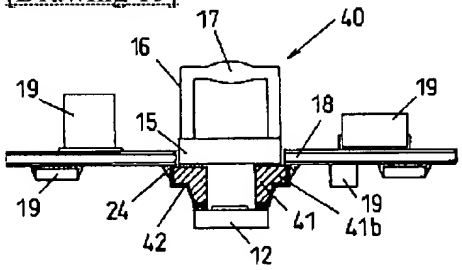
[Drawing 5]



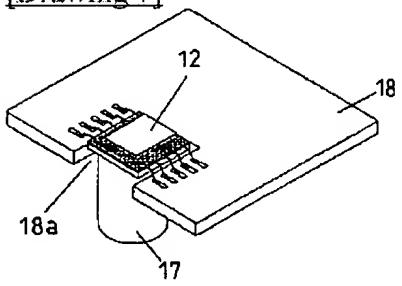
[Drawing 6]



[Drawing 15]



[Drawing 7]



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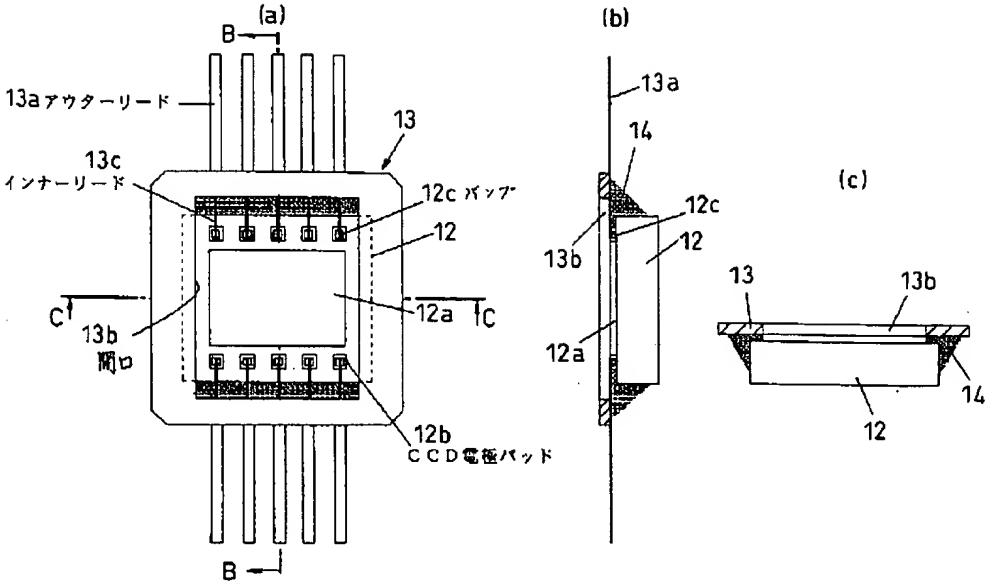
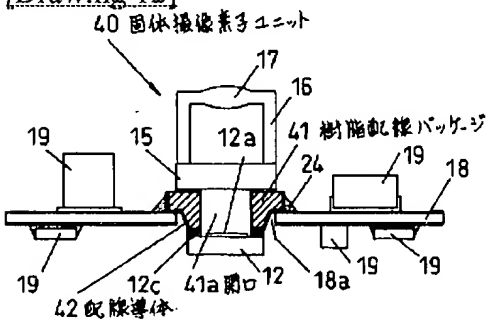


[Drawing 12]



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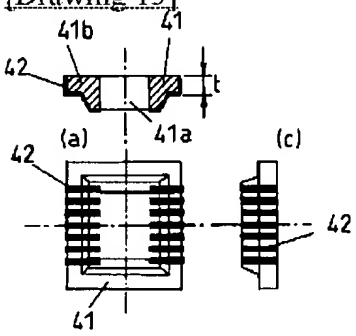
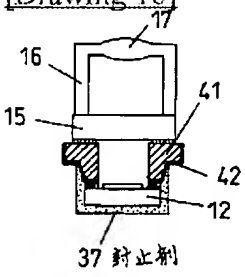
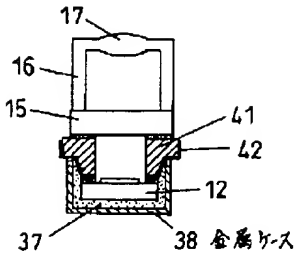


[Drawing 16]



[Drawing 17]



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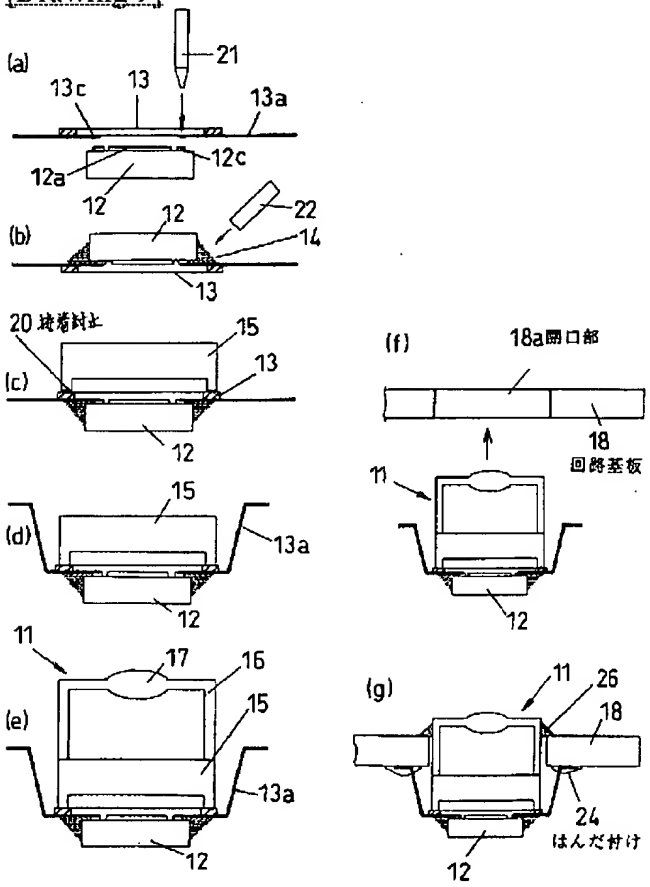
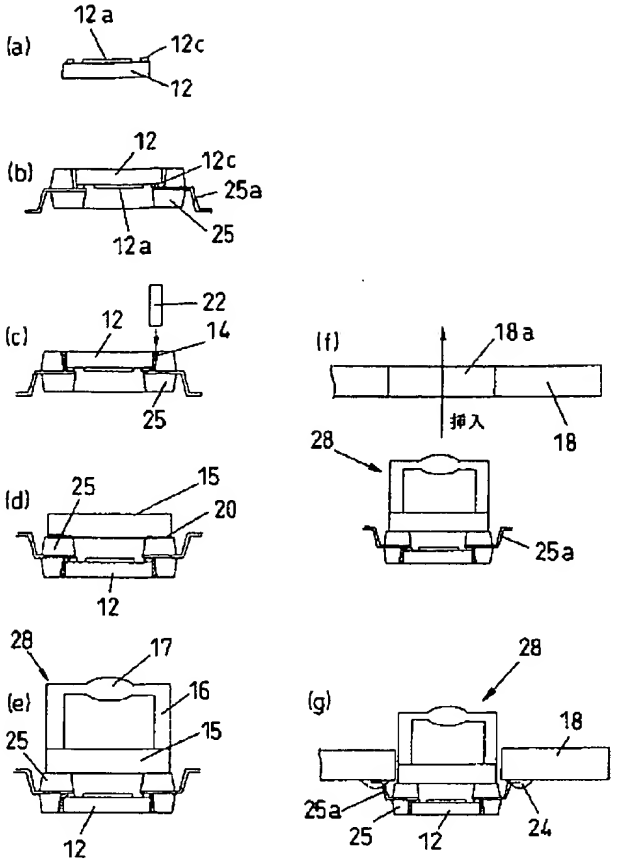
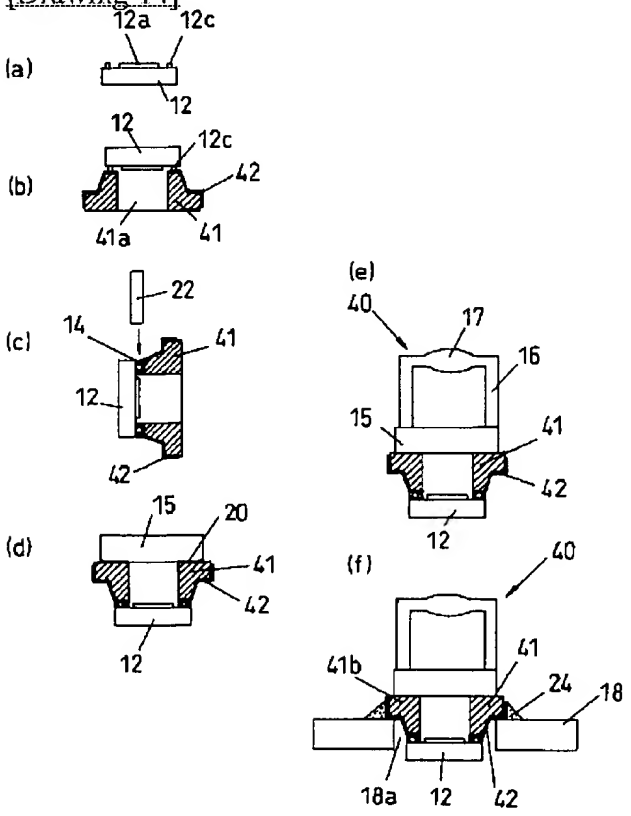


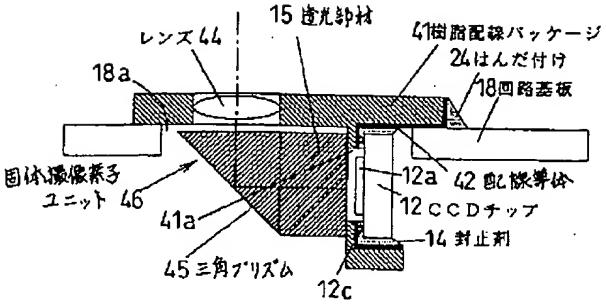
[Drawing 10]



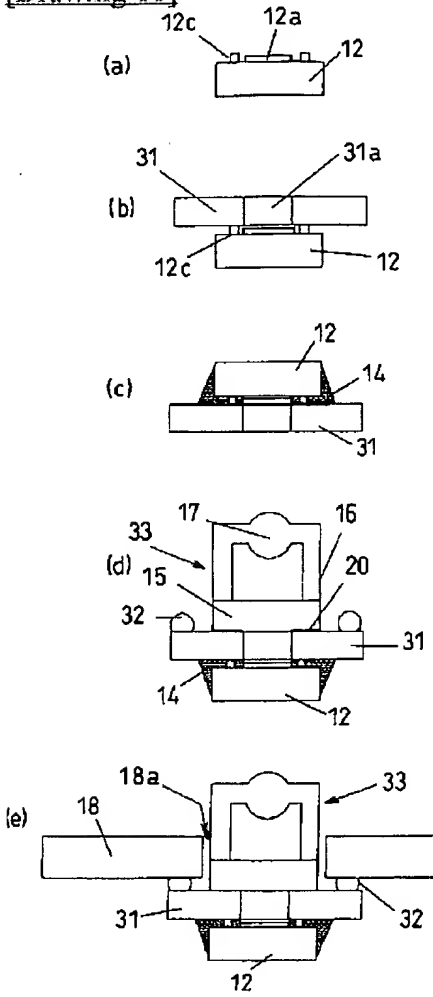
[Drawing 14]



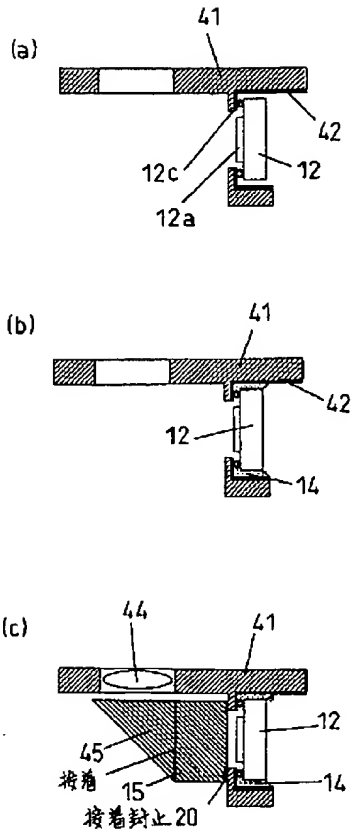
[Drawing 18]



[Drawing 11]



[Drawing 19]



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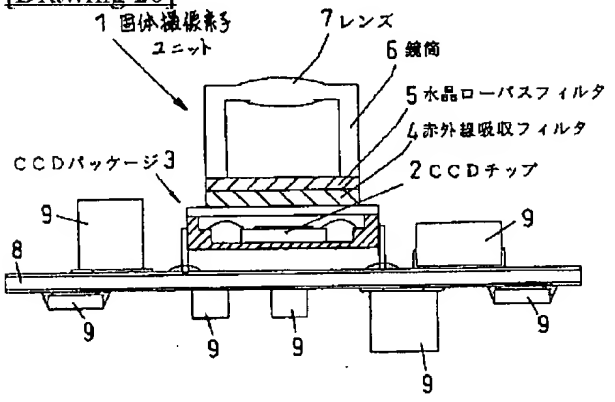

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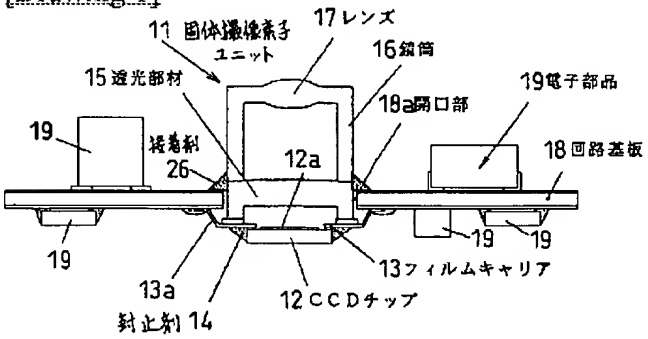
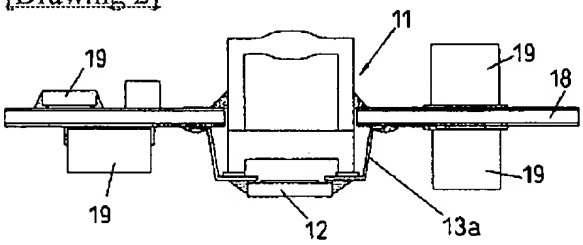
DRAWINGS

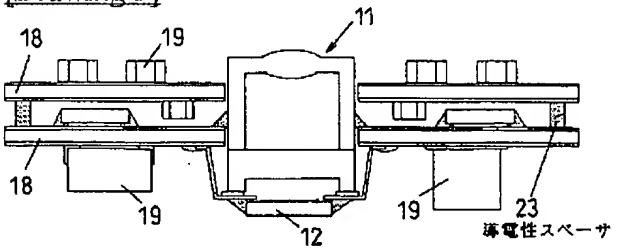
[Drawing 1]



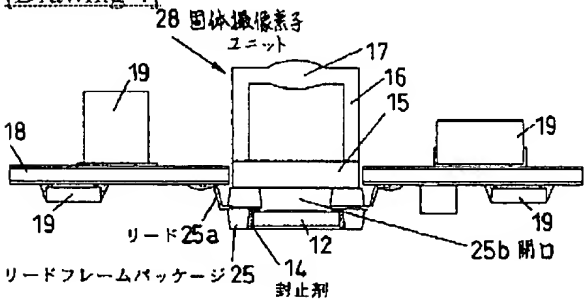
[Drawing 2]



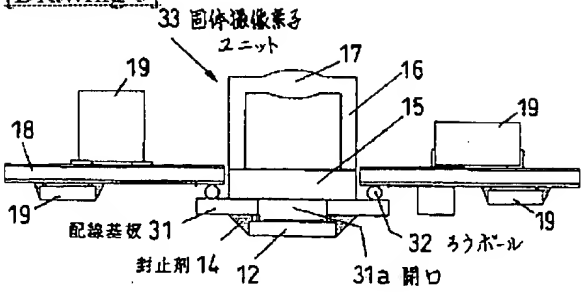
[Drawing 3]



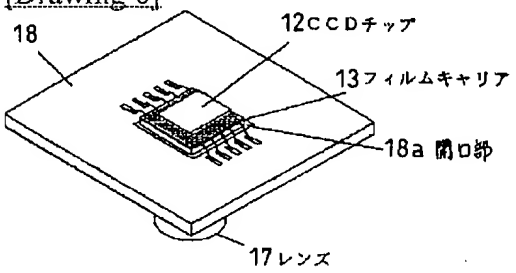
[Drawing 4]



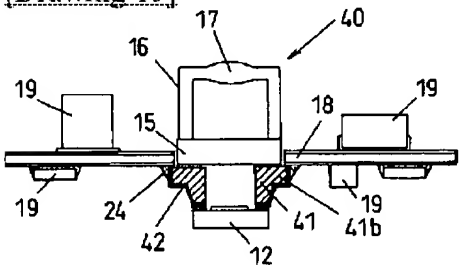
[Drawing 5]



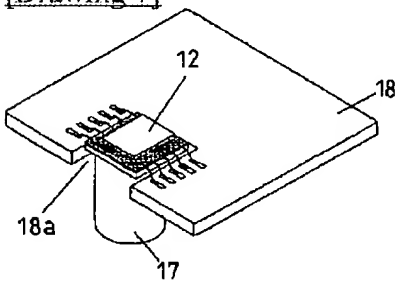
[Drawing 6]



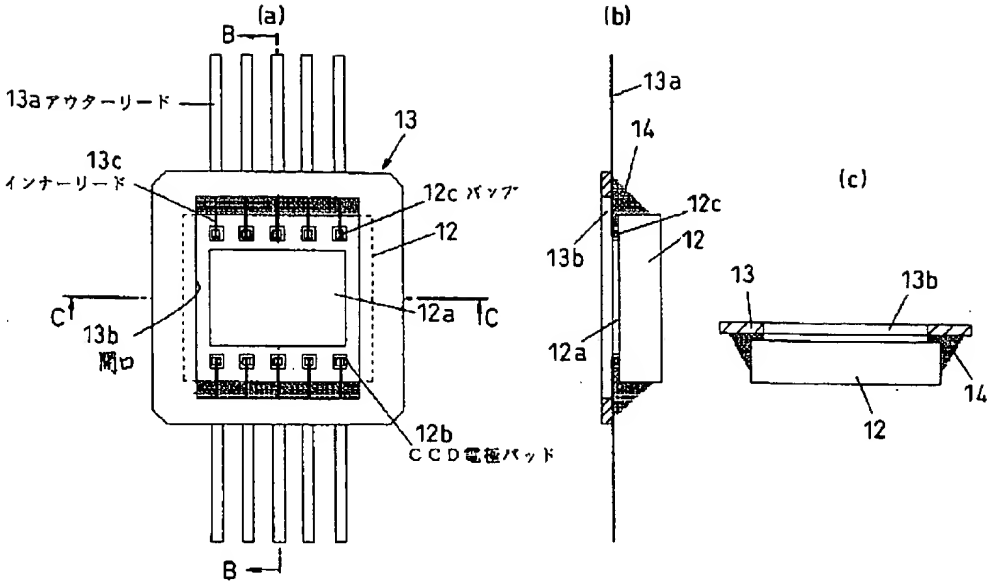
[Drawing 15]



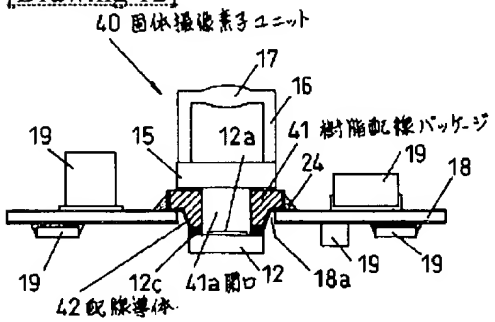
[Drawing 7]



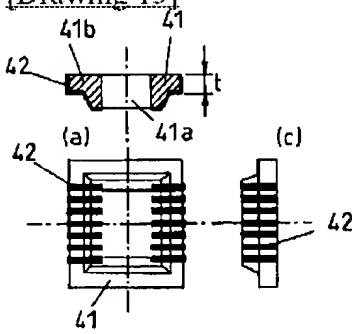
[Drawing 8]



[Drawing 12]



[Drawing 13]



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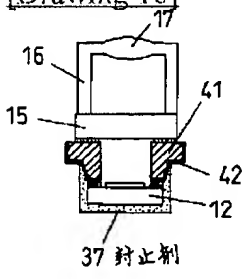
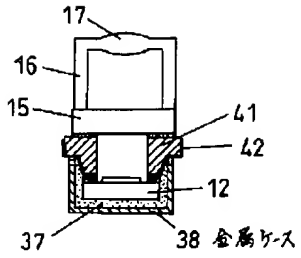
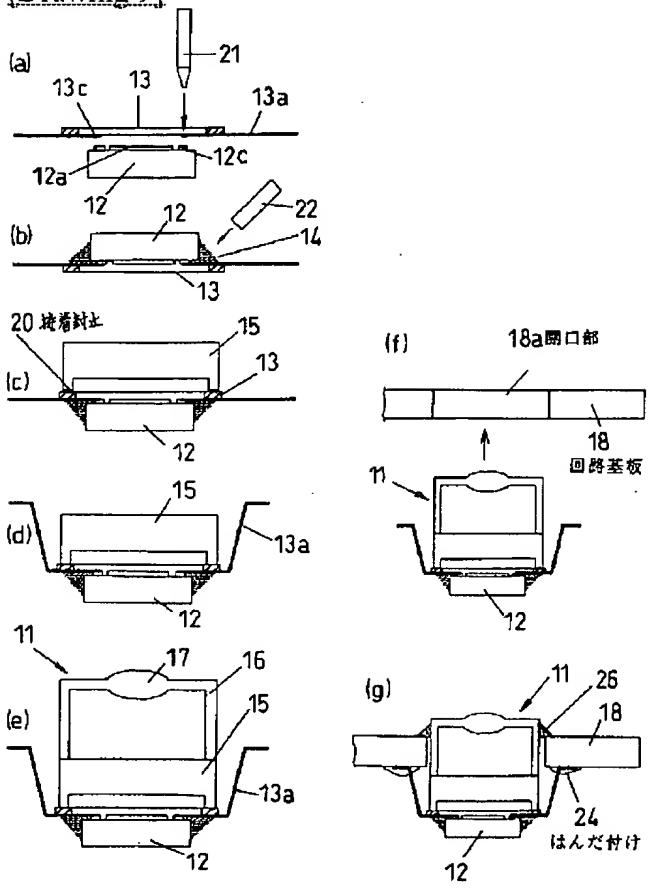


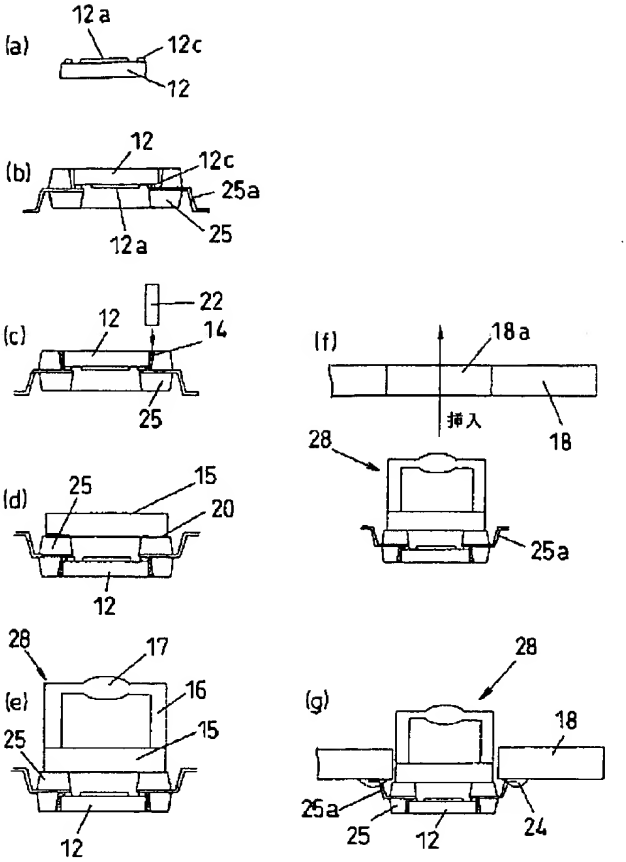
[Drawing 17]



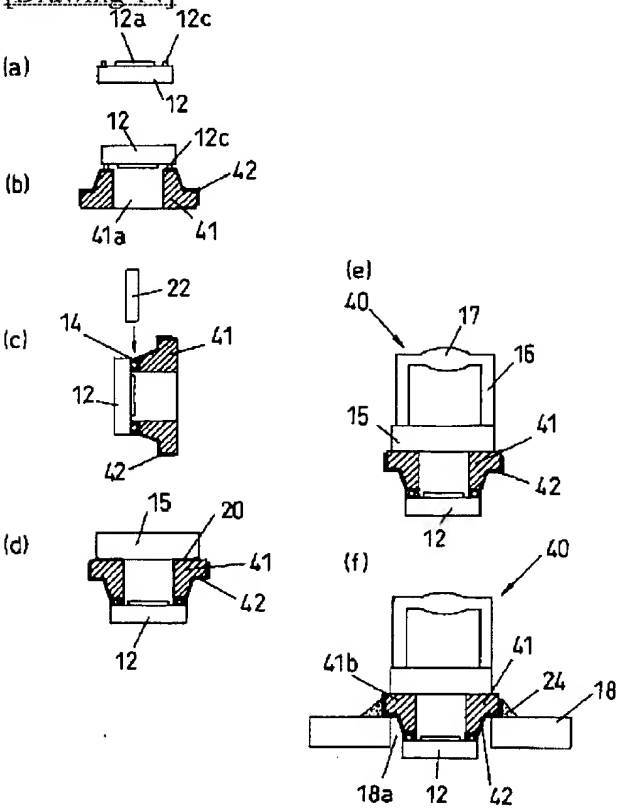
[Drawing 9]



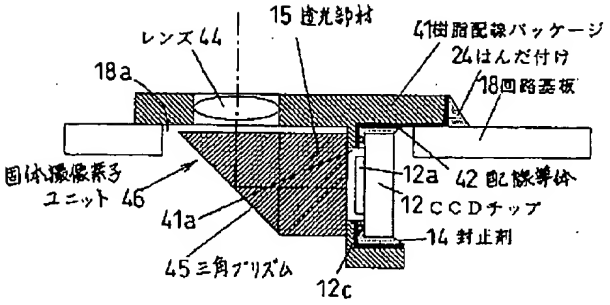
[Drawing 10]



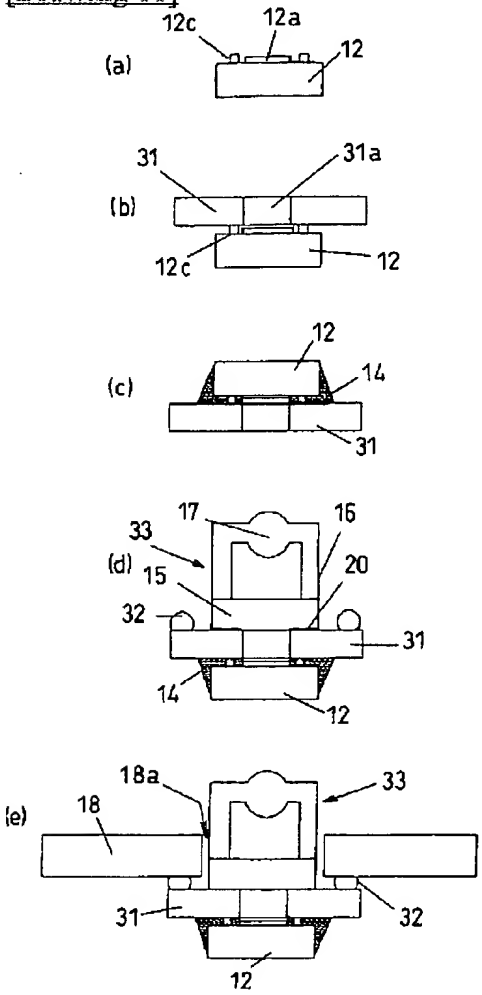
[Drawing 14]



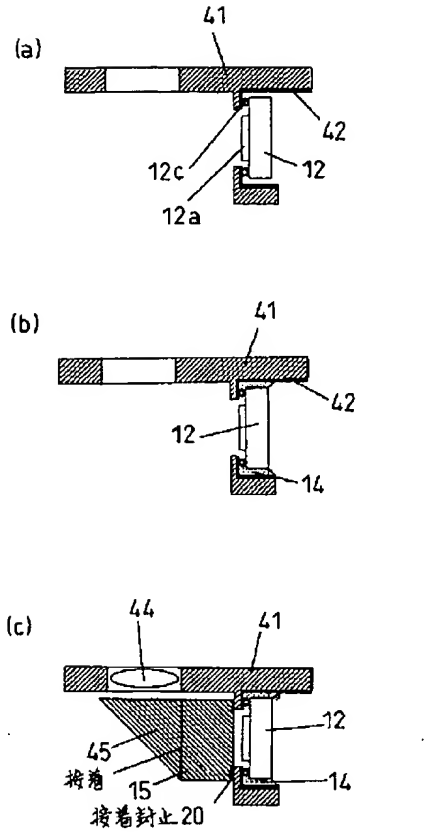
[Drawing 18]



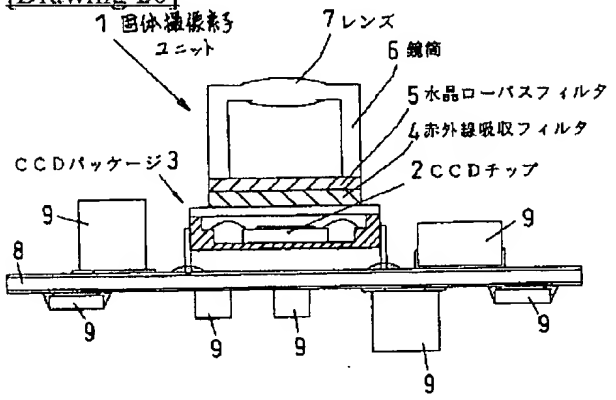
[Drawing 11]



[Drawing 19]



[Drawing 20]



[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] A solid state camera characterized by setting up a location of the path of insertion of said solid state image sensor unit so that the maximum thickness of a mounting substrate which is characterized by providing the following, and which inserted said solid state image sensor unit in said opening of said circuit board so that it might have the circuit board and an optical axis of said solid state image sensor unit might become a right angle to said circuit board, and mounted said solid state image sensor unit may become small, and coming to join said wiring means to said circuit board A solid state image sensor chip which has a light-receiving side in one principal plane A wiring means to spread an I/O signal of the solid state image sensor chip A solid state image sensor unit which consists of image pick-up optical system containing an image pick-up lens and a light filter for carrying out image formation of the incident light which carries out incidence to said solid state image sensor chip Opening which mounts electronic parts and is penetrated to a part
[Claim 2] A wiring means is a solid state camera according to claim 1 characterized by consisting of a tape carrier package which has a opening to penetrate, connecting an end of a lead located in said opening, and an electrode of a solid state image sensor chip with which a light-receiving side is located in said opening, and setting up a fixed position of a solid state image sensor unit with the length of a lead of said tape carrier package.
[Claim 3] A wiring means is a solid state camera according to claim 1 characterized by consisting of a leadframe package which has a opening to penetrate, connecting an end of a lead located in said opening, and an electrode of a solid state image sensor chip inserted in said opening, and setting up a fixed position of a solid state image sensor unit with the length of a lead of said leadframe package.
[Claim 4] A wiring means is a solid state camera according to claim 1 characterized by to set up a fixed position of a solid state image sensor unit with magnitude of a metal ball which it consists of a wiring substrate which has a opening to penetrate, and an electrode of a solid state image sensor chip with which a light-receiving side is located is connected to an end of wiring located in said opening, and said opening, and connects between the other end of wiring of said wiring substrate, and wiring of the circuit board.
[Claim 5] a opening which penetrates a wiring means -- having -- a circuit -- wiring which consists of a resin wiring package which prepared a conductor, and is located in said opening -- a solid state camera according to claim 1 characterized by to connect an end of a conductor, and an electrode of a solid state image sensor chip with which a light-receiving side is located in said opening, and to set up a fixed position of a solid state image sensor unit with thickness of said resin wiring package.
[Claim 6] A solid state image sensor chip with which a resin wiring package was equipped is a solid state camera according to claim 5 characterized by covering the periphery with closure resin formed so that said some of resin wiring packages might be included.
[Claim 7] A solid state image sensor chip with which a resin wiring package was equipped is a solid state camera according to claim 5 characterized by surrounding the periphery with metal casing formed so that said some of resin wiring packages might be included, and filling up with closure resin between

the metal casing and solid state image sensor chip.
[Claim 8] A solid state camera given in any 1 term of claims 1-7 to which the circuit board which has opening which mounts electronic parts and is penetrated to a part is characterized by connecting two or more steps in the direction of an optical axis of a solid state image sensor unit.
[Claim 9] A production process which mounts electronic parts in the circuit board which has opening penetrated to a part, To a wiring member which set up length or thickness for a connection beforehand in consideration of thickness of the circuit board containing mounted electronic parts, and height of a solid state image sensor unit with which this is equipped Like a solid state image sensor unit erector who consists of a production process which joins and closes a solid state image sensor chip which has a light-receiving side to one principal plane, and a production process which pastes up and closes image pick-up optical system which contains an image pick-up lens and a light filter in said wiring member So that an optical axis of said solid state image sensor unit may become a right angle to said opening of the circuit board which mounted said electronic parts to said circuit board Insert said solid state image sensor unit, and it consists of a production process which joins said wiring member which set up length or thickness for a connection beforehand to said circuit board. A manufacture method of a solid state camera according to claim 1 characterized by making it the maximum thickness of a mounting substrate which mounted said solid state image sensor unit become small.
[Claim 10] The solid state camera which sets up the location of the path of insertion of said solid state image sensor unit, and is characterized by to fix so that the maximum thickness of the mounting substrate which incident light which is equipped with the circuit board and carries out incidence to said prism to said circuit board is right-angled, inserted said solid state image sensor unit in said opening of said circuit board so that light which reflects by said prism and carries out incidence to a solid state image sensor chip may become parallel, and mounted said solid state image sensor unit characterized by to provide the following may become small A solid state image sensor chip which has a light-receiving side in one principal plane A wiring means to spread an I/O signal of the solid state image sensor chip A solid state image sensor unit which consists of image pick-up optical system containing prism and a light filter which reflect an image pick-up lens for carrying out image formation of the incident light which carries out incidence to said solid state image sensor chip, and incident light Opening which mounts electronic parts and is penetrated to a part
[Claim 11] a opening which penetrates a wiring means -- having -- a circuit -- a circuit which consists of a resin wiring package which prepared a conductor, and is located in said opening -- a solid state camera according to claim 10 characterized by connecting an end of a conductor, and an electrode of a solid state image sensor chip with which a light-receiving side is located in said opening.
[Claim 12] A manufacture method of a solid state camera according to claim 10 characterized by providing the following A production process which mounts electronic parts in the circuit board which has opening penetrated to a part A production process which connects with a wiring member which spreads an I/O signal of the solid state image sensor chip, and closes a solid state image sensor chip which has a light-receiving side in one principal plane, Incident light which carries out incidence of the image pick-up optical system which contains an image pick-up lens, prism, and a light filter in said wiring member like a solid state image sensor unit erector who consists of a production process pasted up and closed to said circuit board at said prism is right-angled. A production process which inserts said solid state image sensor unit in said opening of said circuit board, sets up so that the maximum thickness of a mounting substrate which mounted said solid state image sensor unit may become small, and is fixed so that light reflected by said prism may become parallel

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[Translation done.]